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ABSTRACT

This annotated bibliography on videotelephony and disability is based on a literature search in nine databases, as well as information collected from literature lists in published reports. The bibliography's scope includes telephony and related fields such as telematics, the use of different kinds of picture telephones, information technology, technical aspects of videotelephony, environmental aspects, ergonomics, and education. About 190 references are included, mostly in English but some in Swedish, Norwegian, Russian, and Japanese with English-language abstracts. Specific areas of special needs that are covered include: mental retardation, motor disability, hearing impairment, speech and language impairment, visual impairment, and elderly adults. (JDD)

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VIDEOTELEPHONY AND DISABILITY

A bibliography

Jane Brodin and Magnus Magnusson

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VIDEOTELEPHONY AND DISABILITY

Jane Brodin and Magnus Magnusson

This report is part of the European project RACE 2033 (Research in Advanced Communications Technologies in Europe), TeleCommunity, which is financed by the Swedish Telecom and the Swedish National Board for Industrial and Technical Development (NUTEK).

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Abstract:

Brodin, Jane & Magnusson, Magnus (1993) Videotelephony and Disability. A bibliography. *Report No 5 in the series Technology, Communication and Disability*, Department of Education, Stockholm University.

This report is based on a literature research in nine databases in the area of videotelephony and disability as well as information collected from literature lists in published reports. The work is conducted in the framework of the European project RACE 2033 (Research in Advanced Communications Technologies in Europe), TeleCommunity. The report also covers related fields such as the use of different kinds of picture telephones, information technology, technical aspects of videotelephony, environmental aspects, ergonomics and education.

About 190 references are included. The specific fields of disability covered in the report are mental retardation, motor disability, hearing impairment, speech and language impairment, visual impairment and elderly. Although elderly people are not a disability group they form a group with special needs due to "age-related" impaired functions.

Keywords: videotelephony, picture telephony, telecommunication, disability, mental retardation, bibliography, literature research

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FOREWORD

This report is part of the European project RACE 2033 (Research in Advanced Communications Technologies in Europe), TeleCommunity. The references in this report have been collected from reference lists and databases. The report covers researches in nine databases and about 190 references are included, most related to videotelephony (picture telephony) and disability.

Most references are in English. Some references are in other languages e.g. Swedish, Norwegian, Russian, Japanese, but with an abstract in English. In the Appendix you will find a separate list with explanations of words and abbreviations used in the text.

We would like to take the opportunity to thank Ingegerd Alemdar for great help in preparing this report. She has checked the translation into English and has been responsible for the typing of the report.

We would also like to thank the Swedish Telecom and the Swedish National Board for Industrial and Technical Development (NUTEK) for financial support.

Stockholm in February 1993

Jane Brodin
Ph.D.

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Speech pathologist

1. INTRODUCTION

Several pilot activities regarding the use of videotelephony by people with disability are at present going on in different parts of the world. With regard to videotelephony and impairment we have made a literature research and collected some references on videotelephony and closely related fields. The sections regarding references on disability are, however, more extensive than the more general references.

The information is categorized with respect to area of disability. The headings refer to some references of general interest. All references focus on a specific area of disability and contain information about videotelephony applications. The references exemplify most of the efforts in the field of videotelephone based remote communication for disabled as well as non-disabled people.

In 1993 the use of videotelephony is celebrating its twentieth anniversary. In 1973 The police district of central Philadelphia and seven external police districts in the same city installed an analogue videotelephony system which is still in use. It is probably the oldest running videotelephone installation in the whole world. Most other installations in this field show a slightly depressing result of non-usage.

Few trials have been made to evaluate the use of videotelephones for people with disabilities. In Europe and especially in the Scandinavian countries several projects are running in 1993, at national as well as at international levels. Today the technological development and the broadband communication have illuminated a new interest in technology. Once again the goal of having general visual remote interaction over the telephone network seems to be a dream on the verge of realization.

In this report we have included all types of videotelephony, i.e. still picture telephony and transmission of moving pictures. Some studies have used still picture telephones in order to stimulate and support communication in people with aphasia (Brodin & Magnusson; 1992; Magnusson, 1992) and mental retardation (Brodin & Björck-Åkesson, 1991, 1992; Brodin & Magnusson, 1992; Pereira, Matos, Purificaçao & Lebre, 1991).

This bibliography is divided into different chapters depending on the field they cover. The report covers general related information on telematics and disability, general related information on technology, technical aspects on picture telephony, ergonomics, environment and picture telephony, education and picture telephony and different disabilities and picture telephony.

2. LITERATURE RESEARCH IN DATABASES

2.1 General information about the databases used in this report

In the start-up process of RACE 2033, TeleCommunity, two literature surveys have been done in the area of telecommunication for people with disability. The first literature research was done in January 1992 in LIBRIS, PEPSY, ERIC, PsycLit (PsycINFO), TUDOR and MEDLINE (MEDLARS). Few references were found. In November 1992 a new survey was done in the following databases: LIBRIS, ERIC, ECER, PsycLit (PsycINFO), MEDLINE (MEDLARS), PASCAL, ARTIFICIAL INTELLIGENCE (ARTIF) and INSPEC.

The first research covered the same references as the second with the exception of PEPSY and TUDOR, which were not included as few references were found. **PEPSY** is a Scandinavian database where all literature published in education and psychology in Sweden, Norway and Denmark are published. **TUDOR** is an informal database from the European project with the same name. This database is not active.

In the second research three new databases were included: PASCAL, ARTIF and INSPEC.

LIBRIS is a Swedish database where all literature published in the country is registered. LIBRIS is common to all Swedish research libraries.

ERIC (Educational Resources Information Center) is a large database of all areas of education, which means that there are references also in the field of special needs and disability. The educational material is collected by the U.S. Department of Education. The database consists of two subfiles: 1) Resources in Education (RIE) and 2) Current Index to Journals in Education (CIJE).

ECER (Exceptional Child Education Resources) is a database in education of disabled childen and gifted children. The database is a comprehensive, bibliographic database on education and development of people of all ages with exceptionalities. About half of the references in ECER can also be found in ERIC.

PsycINFO, ONTAP (ON-line Training And Practice) and PsycLit (CD-rom) cover primarily psychological, educational, anthropological, psychiatric and sociological references. The material represents substantive articles selected on the bases of relevance to psychology from journals and technical reports published all over the world in more than 20 languages.

MEDLINE (MEDLARS) is held by the U.S. National Library of Medicine and covers references in the medical field. The database collect material in dental medicine, nursing, communication disorders, population and reproductive biology. The articles are published in over 70 countries.

PASCAL is produced by the Institut de l'Information Scientifique et Technique (INIST) of the French National Research Council. It covers scientific and technical literature. Most abstracts are in French but the documents come from all over the world and are written in 100 different languages. The database cross-scientific and the principal subjects cover fundamental physics and chemistry, life sciences, applied sciences, technology, earth sciences and information sciences.

ARTIFICIAL INTELLIGENCE (ARTIF) is a cross-scientific database where pshychology, education, medicine, technology and sociology are included. The subjects covered are expert systems, software logic, computer vision, neural network and machine learning. The database covers all aspects of artificial intelligence and related technologies and is the online version of the monthly abstract journal Artificial Intelligence Abstracts. This database is held by the European Space Agency, Italy.

INSPEC (The Database for Physics, Electronics and Computing) covers electrical engineering and electronics (e.g. telecommunications), computers and control systems and information technology.

The number of references in differenct databases changes extremely fast. The information about the number of references in each database is collected from The Swedish National Library for Psychology and Education in the middle of December, 1992 (Krister Lagerborg, personal communication).

Database	**Number of References**
LIBRIS covers	3.200.000 references
PEPSY covers	31.000 references
ERIC covers	753.852 references
ECER covers	76.138 references
PsycINFO covers	814.843 references
MEDLINE covers	6.856.539 references
PASCAL covers	9.000.000 references
Artificial Intelligence covers	14.000 references
INSPEC	3.987.318 references

The results from the literature research showed that the databases used cover millions of references. The result of the research is shown in the section below. Many different keywords have been used and been combined.

2.2 Results from the literature research

LIBRIS

Videotelefoni (videotelephony)	0
Stillbildstelefonering (still picture telephony)	0
Bildtelefoni (image/picture telephony)	0
Videointeraktion (video interaction)	0
Videokommunikation (video communication)	1
Telekommunikation (telecommunication)	0
Telefoni (telephony)	14
Kommunikationsteknologi (communication technology)	18

Most of the references in this area have been classified as communication technology and telephony only include ordinary telephoning. The only references in the area of disability found in the database are already mentioned in this report. No new references have been found.

ERIC (1985-1992)

Telecommunication	226
Telecommunication and disability/handicap	8
Video and communication	6
Video and disability/handicap	0
Communication technology	1966
Communication technology and disability/handicap	29
Videotelephony	0
Videophones	0
Picture telephones	0
Still picture telephones	0
Pictorial telephones	0
Image telephones	0
Telematics	20
Telematics and disability/handicap	1

Telecommunication and disability (8 references). The refences were about the ADA (Americans with Disabilities Act), deaf and hearing impaired and financial matters. Two of the eight references were of special interest and are included in the report. Both were in the area of education and technology. The two references are:

Newroe, K. (1991) Telecommunication Technologies to Deliver Assistive Technology Services

Naiman, D. (1988) Telecommunications and an Interactive Approach to Literacy in Disabled.

Video and communication (6 references). These references cover media investigations. Two of them were in the field of education. The first one was about teletraining in the navy and the second one was about video-mediated communication and leadership in small groups. No one were of interest for the area of disability.

Communication Technology and disability (29 references). Nine references were about legal acts and rules for using the telephone, eight references were about information about the possibilities to use the service, one about databases, six in the area of education and five about deaf and hearing impaired. The following references have been included in the report:

Naiman, D. (1988) Telecommunication and an Interactive Approach to Literacy in Disabled Students. Final Report

Skowron-Gooch, A. (1987) Communication Assessment Procedures for Students with Severe and Multiple Disabilities.

ECER (1985-1992)

Almost the same results as in ERIC. The references are mostly about education of disabled children and highly intelligent and talented children. No new references were found in the area of telecommunication and disability.

PsycINFO (1985-1992)

Telecommunication and disability/handicap	1
Video and communication	83
Video and communication and disability/handicap	0
Video and disability/handicap	1
Videotelephony	0
Videophones	0
Picture telephones	0
Still picture telephones	0
Pictorial telephones	0
Image telephones	0
Telematics	1

Telecommunication and disability (1 reference). This reference contains information about difficulties to use telephones for hearing impaired but is not related to videotelephones and thus not relevant for this report.

Video and communication (83 references). These references covered the effects of video on humans, public media investigations about the use of video and different psychological aspects with regard to video communication. No one was in the area of disability.

Video and Disability (1 reference). This reference was about human factors for people with visual impairment and not specific for the area of telecommunication.

Telematics (1 reference). This reference was about electronic post in general and was of no interest in the area of disability.

MEDLINE (1991-1992)

Telecommunication and disability/handicap	0
Video and communication	41
Video and communication and disability/handicap	0
Video and disability/handicap	4
Videotelephony	0
Videophones	0
Picture telephones	0
Still picture telephones	0
Pictorial telephones	0
Image telephones	0
Telematics	2

MEDLINE is one of the largest databases for medicine, rehabilitation and related areas. Most of the references are in the medical field.

Video and communication (41 references). General references about video communication: No one is in the area of disability.

Video and disability (4 references). Two references were about medical assessment and treatment of Parkinssons disease and two about ergonomics. No one is related to the area of telecommunication.

Telematics (2 references). Both references are in the medical field, one about ECG and the other one about electro therapy. These references are not relevant for videotelephony.

PASCAL (1973-1992)

Telecommunication	60.704
Disability/handicap	13.939
Telematics	371
Telecommunication or telematics and disability/handicap	44
Videotelephony/videophones	7
Picture telephones	0
Still picture telephones	0
Pictorial telephones	0
Image telephones	0
Videotelephones and/or telecommunication or telematics and disability/handicap	50

Telecommunication (60.704 references).
Disability/handicap (13.939 references).
Telematics (371 references).

The above mentioned keywords are not useful if they are not used in combinations. When combining these three keywords the result was 44 references. These references could be useful, but many of them were too general. Most of the references in Telematics are general. Many of them are included in the last literature research with combination of the four key words.

Videotelephony/videophones (7 references). These references are included in the below combination with four key words.

Videotelephones and/or telecommunication or telematics and disabiltiy/handicap (50 references). This would best relate to the area in which we are interested.

The 50 references are in the following areas:

physical disabled	2
deaf and hearing impaired	12
speech recognition	3
blind and visually impaired	9
ergonomics	6
education	6
technology	22
moving images	2
elderly	2
medicine, telefax	2
others	3

Most references are in the area of technology (22) and deaf or hearing impaired (12). Disability covers 26 references, ergonomics 6 and education 6. The references relevant to telecommunication have been included in the report. No reference in the area of mental retardation has been found.

ARTIFICIAL INTELLIGENCE (1966-1992)

Telecommunication	115
Telecommunication and disability/handicap	2
Video and communication and disability/handicap	0
Videotelephony	0
Videophones	0
Picture telephones	0
Still picture telephones	0
Pictorial telephones	0
Image telephones	0
Telematics	1

Telecommunication (115 references). Most references are in the technical field and discuss questions about network, transmission of signals etc. These references are not relevant for videotelephony.

Telecommunication and disability/handicap (2 references). Only two references cover the area of disability. These two references are included in the report.

Taylor, M. (1988) In the BBS world, Who's handicapped? Nobody.... except bad spellers!

Blomberg, M., Carlsson, R., Elenius, K., & Granström, B. (1984) Speech research at KTH - Two projects and technology transfer

Telematics (1 reference). This reference was about technology and had nothing to do with telecommunication and disability and we have therefore excluded it from the report.

INSPEC (-1992)	
Telecommunication	36.500
Disability/handicap	2.355
Telematics	316
Telecommunication or telematics and disability/handicap	110
Videotelephony/videophones	27
Picture telephones	0
Still picture telephones	0
Pictorial telephones	0
Image telephones	0
Videotelephones and/or telecommunication or telematics and disability/handicap	16

Disability/handicap (2.355 references). As this keyword was too wide we continued with *mental retardation.* This resulted in 28 references. Most of these references were related to damages caused by the atomic bomb and the irradiation from it. Questions related to prenatal irradiation and diagnostics covered 15 references, education covered 2, support services 2, incontinence 2 and medical issues 7. Most studies on the atomic bomb was done in Japan. No references in the area of mental retardation illuminated social integration or communication.

Telecommunication or telematics and disability/handicap (110 references) *Videotelephony/videophones* (27 references). Four new references were found.

Gulaska, S. (1990) The development of a visual telephone for the deaf: using transputers for real-time image processing.

Chung-Lin, Huang & Chi-Hoo, Wu (1989) Very-low-bandth visual communication for the deaf

Heiss, R. (1989) Visual telephone and videoconference terminal equipment

Ohara, S. (1985) Viewpoint of considering HA (home automation)

Videotelephones and/or telecommunication or telematics and disability/handicap (16 references). These references are in the area of deaf and hearing impaired (8), elderly (2), videoconferencing (2), general issues and human factors (4). No new references were found.

Table 1. Compilation of results

Database	Libr	ERIC	ECER	PsycIn	Medline	AI	Pascal	Inspec
Videotelephony	0	0	0	0	0	0	7	657
Videotelephony and Disability	0	0	0	0	0	0	0	27
Still picture telephony	0	0	0	0	0	0	0	0
Picture/image telephony	0	0	0	0	0	0	0	0

We would like to point out that the above table only give the results from one specific keyword. One exception is videotelephony and disability which decreased and limited the number of references in INSPEC.

To conclude, there are few references in the area of videotelephony for people with disability in the databases mentioned above. There are also other databases, but we have chosen some of the most comprehensive with regard to the concept special needs. HILITE is a British database, which has been recommended to us, but we have not been able to collect information from it from Swedish research libraries. Most references in this bibliography have therefore been found in different reference or literature lists in various publications.

The purpose of this report is to give the state of the art of the videotelephony field for people with disabilities. Some references are not included in the report, but we have tried to collect the most valuable literature in the area of telecommunication and disability.

3. GENERAL RELATED INFORMATION ON TECHNOLOGY

In this chapter we introduce a few reports being examples of related reading about technology of picture communication. The reports include basic textbooks as well as conference reports and should be seen as examples from a fast-growing field of information. However, we have found no additional references where videotelephony has been explicitly mentioned. A total of 26 references are included in this section.

Andersson, K. (1990) Elektroniken i ljud och bilder [Electronics in Sounds and Pictures]
This is a textbook for the general public in Swedish on new tele-technology available in the 90:s. The material gives a basic introduction to technology. (Confer Hilsman,1989). It introduces everyday technology and gives short instructions to a number of electronic everyday equipment.

Berg, A. & Hård, L. (1991) Gränssnitt människa-dator - ett USA-pespektiv [Interfaces Between Human and Computer - a US-perspective]
This report is concentrating on new Hypermedia systems and discussions on future interfaces for computer connections. The report is based on a journey in 1989 across the US, visiting 12 American High-tech companies and collecting information about their work with the human-computer interface. Most of the companies were software development companies and few of them were specialized in telematical applications. However, the study analyzes the remote communication structures of the companies and discusses in what manners the companies use information technology in their distribution of services and products.

The part of the report from the NYNEX company is of specific telematic interest as it describes efforts to create virtual interaction in a three dimensional environment. The report as a whole is of basic interest in order to get a better understanding of available interface technology.

Berti, V. (1990) Introduktion till lokala nätverk [Introduction to LAN:s (Local Area Networks)]
This is a descriptive book about the technology related to Local Area Networks. The book covers the hardware as well as the software technology and should be an excellent textbook for anyone who is interested in LAN technology ranging from the ambitious amateur to the professional. It also gives information about the availability of the equipment described.

Boucherat, P.R., Benton, R.H., Shanavaz, H. & Wang, E. (1990) Emulation of a Multi-Media Workstation for the Investigation of Integration Principles in Design for Usability

This is an evaluation investigating the principles for the use by designers of multimedia services over ISDN. A multiple evaluation strategy has been created as well as an emulation of a multimedia workstation. The proposed methodology has been broken down into fourteen stages from preliminary investigation through modelling to the final presentation of analyzed data. The tools of evaluation are described and developed. Finally the pilot study of the emulated workstation is described and evaluated, resulting in recommendations and considerations for the future.

Boy, G. A. (1992) Advanced Interaction Media

This report is from a project at the AI Research Branch at NASA-AMES Research Center, in California. This is a cognitive analysis of different systems of interaction or media, concentrating on the concept of hypermedia and multimedia. It is in reality an analysis of all available metaphors and concepts of interfaces between human beings and computers, concentrating on the concepts of hypermedia as the most general form of interface. The author introduces the concept telepresence, which means that you feel as if you are present in a remote environment. The report also discusses the creation of a European Institute of Cognitive Sciences and Engineering.

Cerveire, A. (Ed) (1988) Computer Communications Systems

This is a scientific book which describes all the aspects of Message handling Systems/MHS communication with examples from and descriptions of present research activities, written by the foremost researchers in the field. Aspects including corporation use as well as small private networks are described and analysed. The social aspects of MHS communication is given a large place in this all-covering book. For those who want to get a grip of the whole concept of MHS this is a good book. A small part of the book concentrates on information about picture based distance communication.

Delogne, P. (1990) Picture Coding for Videotelephony, Televisions and High-Definition Television

This is an extensive paper of different bit-saving coding techniques used to transmit pictures. A coding algorithm is presented for each of the reduction techniques. The optical fibre technology has not made all types of picture transmission possible, thus expressing a great need for further development in this field. The paper discusses future techniques for network communication.

Delogne, P. & Macq, B. (1991) Universable Variable Length Coding for an Integrated Approach to Image Coding
The report is a paper of a new entropy coding scheme called UVLC. The method shows transformation of groups of blocks at the bit level, using universal codes designed for binary memoryless sources. The method can be used for any video transmission coding including HDTV and high speed broadband transmission above 2 Mb/s. The necessary technology can be included in one single chip.

Dopping, O. (1992) Teletjänster [Teleservices]
This is a report on telecommunication facilities available. The report is aimed at people working in small and middle sized companies and demands little special technical knowledge. All types of telecommunication is covered as well as the history and the economics of telematics. A small part is also aimed at the future. One part gives an up-to-date presentation of interactive video-communication, another on fax communication. This is one of the most recent and broadest of all textbooks on telecommunication available in a Scandinavian language today.

Eriksson, H (1992) Trade-offs in Teleconferencing
Teleconferencing is a short-term goal within the multimedia workstation project which is a part of the MultiG frame project (confer Pehrson & al). This report presents some of the considerations on the way to a functioning audiovisual teleconferencing system. It is based on the work with a general telematic desk-top system at the Swedish institute SICS (Swedish Institure for Computer Science) in Stockholm. An integrated part of this system is a videotelephone function, for person-to-person communication within a UNIX net.

Filloux, A. (1989) La Domotique/Automating the home
This is a conference report where the situation on technology in the homes is presented under three main headings:

- The British home technology with criterias for integration, interaction and standardization
- The work connected to the European Eureka project, concentrating on transmission by satelites etc.
- Applications for disabled people such as telebanking etc.

The report is written in French with an appendix on the technology in English.

Haskell, B.G., Mounts, F.W. & Candy, J.C. (1972) Interframe Codings of Videotelephone Pictures

The report describes a method to abolish the reduncancy in a common TV-picture. This can be accomplished by adding memory to the constant information at the receiving end. Several techniques are described, all emphasizing on the necessity to divide the information into two groups, namely; Information which remains constant and information which changes between the frames. The report is made by the BELL telephone company in the early seventies.

Held, R. M. & Durlach, N. I. (1992) Telepresence

The paper presents an ongoing discussion of the concept of telepresence and describes the different components of the concept as well as the experience of using telepresence. The report states that today we have neither a definition nor a practical understanding of what telepresence really is other than that it can be described as an experience resulting from using a certain type of technology. The authors stress that more research is needed in this area.

Hilsman, H. R. (1989) The New Electronic Media - Innovations in Video Technologies

This is a basic textbook for people with no specific knowledge on new teletechnology available in the 90:s. It gives a basic introduction to technology. The report makes a comprehensive introduction to the narrow-band-communication of today and the future broadband communications. Compare with Andersson (1990) or Dopping (1992].

Karlsson, G. (1992) IMTS - Utredning vid KTH om interaktiva multimediala träningssystem [Investigation into Interactive Multimedia Training Systems]

This short article presents an investigation into interactive systems at the Royal Institute of Technology in Stockholm and it concentrates on the adminstrative, economical and developmental activities that should be made concerning education, research and development in this field in relation to international activities. The investigation specifically points to the use of videocenferences, computer support in the classroom, access via networks to educational databases and the use of MHS-systems. Education is viewed on as an active process with the pupil as a subject and not as an object.

Khakhar, D. (1987) ISDN ur ett användarperspektiv [ISDN from a User Perspective]

This is a description of the facilities of ISDN in general and a review of experiments and applications concentrating on the experiences of the US. A presentation of different user interfaces is given and also examples of

different services. One part of the report recommends planning strategies that should be considered for the future. The perspective of the business enterprises is taken. Of the three specific ISDN-reports mentioned here (Andersson, 1988 & Svenska Dataföreningen, 1989) this is the broadest report, giving an international perspective.

Nordqvist, I. (Ed) (1989) Data- och Telekommunikationer [Computers and Telematics]
This is an antology of reports, describing the telematical infrastructure in the Swedish society today, trying to catch future problems and possibilities of the different regions of the country. The antology starts with a report on the general possibilities of technology today. Different solutions from companies using telematics in their work are presented as case studies. In one of the reports a comparison with several other countries is made. One report even contains "confessions from a dissatisfied user", examplifying the difficulties encountered when you try to get the right technology. The report also gives information on videoconferencing within companies and corporations. In general the antology views picture based communication as a powerful communication tool.

Pehrson, B., Gunningberg, P. & Pink, S. (1992/a) Distributed Multimedia Applications on Gigabit Networks
This is a report describing the research program MultiG, a cooperative project between Swedish academic circles and the industry. The report is concentrating on the exploration of collaborative desktop metaphors and telepresence applications for the future. MultiG is trying to develop new systems and new interfaces using a UNIX based operating environment and aiming for broadband transmission. A videophone application is an integrated part of the collaborative desktop as well as of the general telepresence part of the project which also includes a small project for the development of a robot control for disabled people.

Pehrson, B., Gunningberg, P. & Pink, S.(1992/b) MultiG - A Research Program on Distributed Multimedia Applications and Gigabit Networks
This is a similar report to Pehrson, Gunningberg & Pink (1992/a) of a national research program trying to create and evaluate distributed multimedia applications and highspeed networks. The main goal for the project is to strengthen the academic infrastructure in Sweden. In this report some new technological information is found as well as a bibliography.

Schurmann, G., Weiss, K. H., Tschichholz, M. & Holzman (1988) Multi-Media Document Handling Architecture in an Distributed Broadband Environment
This is a short analysis of multi-media documents and suggests a communication architecture for multi-media documents in a distributed

broadband environment. The goal is to present the user with an environment that integrates text, still pictures, moving pictures and sound.

Sheridan, T. B. (1992) Musings on Telepresence and Virtual Presence
The report gives a definition of the concept of telepresence from three measurable physical variables and their relation to different aspects of human performance which might be affected. The three variables are control of sensors, ability to modify environment and the extent of sensory information. The report defines dependant and independant variables in relation to the three main variables. The research question is how the geometric mappings of body and environment contribute to a sense of presence, training and perfomance.

Smedshammar, H., Frenckner, K., Nordquist, C. & Romberger, S. (1990) Läslighet hos dataskärm och papper [Readability on Monitors and Paper]
This is a comparison between the readability of text on paper and computer monitors. The evaluation showed that text on a monitor was experienced as more tiresome to read than text on paper. The results were based on a comparitive study with two groups of readers, using texts of about the same length presented on paper with laser text and an alphanumerical as well as a graphic screen. The average reading time was measured and also the comprehension of the text as well as a rating of fatigue before and after test.

Ståhl, O. (1992) Tools for Cooperative Work in the MultiG TelePresence Environment
This is a description of a software tool in the Telepresence sub-project. The tool makes it possible to create a virtual whiteboard in the computer where all kinds of pictures and messages including video-pictures can be transmitted over the telenetwork or a LAN. Several users will be able to use this tool at tha same time and the whole system is expected to be a tool for integrated cooperation at an office using a UNIX-based system.

Svenska Dataföreningen [Swedish Computer Association] (1989) Planering inför ISDN [Planning for ISDN]
The Swedish computer Society has made a report, trying to map necessary activities in the infancy of ISDN. The report is essentially technical with a clear analysis of the technology. However, only general non-disability information is given mostly directed towards companies being presumtive ISDN users. All the included reports and presentations of ISDN are exaples from a rapidly growing flow of written information on ISDN.

Sysdata (1990) Signals Travel
This report on the general aspects of videoconferencing is making an economical comparative analysis between traditional conferences and videoconferences in Switzerland. The technology behind videocon-

ferencing is explained on the basis of the Swissnet network, also including a mobile installation. A separate videophone for the workplace is under construction as well as special applications for small groups. Negative attitudes towards videoconferencing are explained as being psychological.

Öquist, B. (1992) Närhet och avstånd [Proximity and Distance]
This is an initiated report from the United States and Canada of the use of information technology in corporations and research centres. The report contains descriptions of the future plans of the companies and also an analysis of the infrastructures of the different societies. It is based on a three week study visit by a group of persons selected by the Swedish Telecom. The main goal of the report is to give a general picture of trends and strategies in the american society in general today regarding the use of information technology.

4. GENERAL RELATED INFORMATION ON TELEMATICS AND DISABILITY

Most references in this chapter have an emphasis on various kind of disabilties. A total of 40 references are included.

Aeschleman, S.H., Tawney, J.W., Deaton, S.R. & Donaldson, R.M. (1979) Using Telecommunications Technology to Instruct Rural Severely Handicapped Children
This is a report of an early project using different kinds of teletechnological equipment in order to give educational support. Closed circuit TV, databases and terminals/text-telephones are among the equipment used and the project was one of the first to use electronic bulletin board systems in education. A therapeutical aspect was considered in the work. The visual support was experienced to be of importance in communication.

Andersson, L.-Å. (1988) ISDN och Handikapp. Det Tjänsteintegrerade digitala nätet och dess användningsområde [ISDN and its applications]
This is a general introduction into the concept ISDN. The technology and the economy of ISDN are described and the possibilities for disabled people are investigated. A list of possible services, and services already available for disabled people is presented and future plans are indicated. The report is intended to be a basic introduction for a very broad group of users into the basics of the ISDN-technology.

Astbrink, G. (Ed) (1990) Proceedings of the Second European Conference on Policy Related to Telematics and Disability
These are the proceedings from The Second European Conference on Policy Related to Telematics and Disability, June 19-21, 1990, Paris. The report contains papers and group discussions.

Augustsson, L. (1989) Telematik och handikapp i USA [Telematics and Disability in the US]
This is a general report on activities in the field of telematics for disabled people in the US. Many companies and resource centers are presented and several different technical aids and technological solutions for telecommunication are discussed. The report includes technical applications of special interest. Picture communication is only presented in relation to general television technology. Four American researchers in the field of videotelephony for hearing impaired persons, are presented briefly. The report contains a large section of appendices containing addresses and additional information.

Augustsson, L. (1992) Bredbandstrender i USA [Broadband tendencies in the US]
This is a general report on recent tendencies in the US, concentrating on the use of picture based communication applying broadband communication. The report presents concrete ideas concerning cable-TV and videotelephony, examplified with several field trials presentations and integrated multimedia communication. A general presentation of the strategy for broadband development in the US is also presented briefly.

Birk-Nielsen, H. & Gillberg, I. (1978) Telecommunication Performance of Persons with Hearing Handicap in Relation to Speech Reception Threshold
This is a research study on the performance of 203 hearing impaired persons. If the threshold of word-perception on the ear, which is best, is between 0 - 25 db, the users can use the telephone without any problems. If it is over 45 db, it is advisable to use a holder with a built in amplifier or a telephone connected to an amplifier.

Brodin, J. & Magnusson, M. (1992) Teknologi och människor med funktionsnedsättningar [Technology and people with disability]
This is a report based on the 1992 years CSUN (California State University, Northridge) conference in March in Los Angeles. The conference covered 2.200 persons. In the report children with cognitive disabilities, telecommunication and virtual reality have been covered. The CSUN conference is regarded as one of the most important in the handicap area and brand new technology is always presented. The conference applies to a wide range of people such as persons with disabilities,

professionals working in the handicap field, researchers, manufacturers administrators etc.

Browne, A. (1978) A Reading Aid for the Partially Sighted
The report is a presentation of a prototype reading system, developed in the UK. The system is portable and contains many of the features found in a closed circuit TV system although it is expected to be cheaper. A short technical description is included as well as some data from practical field trials. Comments from technical evaluators are also included. The report gives a review of different systems and technical solutions.

Courtade, M., Duquerroy, J.Y. & Steru, M. (1979) Protection des personnes et des biens par moyens Éléctroniques
This is a decription of a telematic alarm, utilizing the public telenetwork in a general way. It permits protection of people and property from damages such as theft, fire and accidents. The alarm can also be used by disabled, isolated and elderly people. It can also be used as a remote supervision tool.

de la Bellacasa, R.P. (1980) Telecommunications, computers and other Complimentary Communications Means on Behalf of the Disabled
This is a presentation of different types of computer based technology available for hearing impaired and visually impaired people. Mainly computer based technology is described and examples of telecommunication equipment are given, such as text telephones for instance.

Dopping, O. (1987/a) Texttelefoni för döva, dövblinda och talskadade [Texttelephony for Deaf, Deafblind and Speech Impaired People]
This report gives a conclusive presentation of the use of text telephones in Sweden. It contains a market survey and an analysis of the use as well as the needs of the three main groups of users: deaf and hard of hearing persons, deafblind and speech impaired persons. The report is very concrete and contains several case studies as well as technical descriptions of equipment. In the context, the concept text telephony gives a very broad content and includes modems with specific software as well as specific Braille terminals and telefaxes.

Dopping, O. (1987/b) Telecommunication for Disabled People - the TDP Report
This report as well as Dopping (1987/a) are rather peripheral to this context, but they contain pieces of information on picture communication. However their content is of basic interest as they present the whole background to videotelephone communication for disabled people by describing text telephone communication and, in this report, examples of all available telecommunication facilities for disabled people. When

talking about faxcommunication, it becomes clear that remote text communication also can be considered as visual communication.

Both reports constitute a baseline of facts for telecommunication and disability, although this report tries to give a basic introduction to the field of telecommunication for disabled people in general.

Dopping, O. (1989) Bildkommunikation för personer med handikapp [Picture Communication for Disabled Persons]
This is a broad presentation of picture communication in general, from a technological as well as a user perspective. The main focus of the report is the presentation of activities and ideas regarding the use of picture communication of people with disabilities. Most of the ideas described relate to telecommunication. Several projects are described as well as the limitations and possibilities of present technology. An English abstract is included.

Ekberg, J. (1991) Picture Communication and Accessibility COST 219,
The report gives a brief definition of picture communication and of the information content of different sorts of picture based communication in terms of number of bits/second. The author presents the different channels available for picture transmission and their capacities. Finally the different types of access tools are introduced, concentrating on different interfaces and their importance for the user. The report also mentions several information centres for distribution of information which can not be distributed directly. Totally the report gives a concise and definite presentation of the concept of picture communication over the tele-networks.

Emiliani, P.L. (1991) Race Project R 1066 IPSNI Integration of People with Special Needs in IBC
The report makes a presentation of a project which main goal is to analyze the limitations of accessibility to the broadband environment and related services and applications for sensory and/or motor/speech impaired persons. The report presents a model for the analysis and different models of interaction are presented. The project is specifically investigating the multimedia concept and is conclusively aiming to give designers specifications for the needs of disabled people, connecting the groups of rehabilitational specialists and designers.

Gillberg, I. (1977) Rehabilitation Technology and Telecommunication in the Nordic Countries
This is a report suggesting cooperation between the five Nordic countries in the field of telematics for disabled people. The report is concentrating on studies of specific types of equipment, especially text telephones for deaf people and visual alarms for elderly or disabled people.

Gonzalez, A.J., Gardeazabal, L. & Arruabarrena, A. (1991) Providing Telecommunications Access to People with Special Needs
The report presents the general possibilities today of telecommunication and states that it is necessary for disabled people to have access to telecommunications. It defines different uses of telecommunication facilities from the aspects of different groups of disabled people as well as therapists and rehabilitation specialists. It defines the restrictions that has to be overcome for different groups and it mentions design aspects, concentrating on keyboard adaptations for terminals. Finally the report presents European activitities in the field of telecommunication and disability and concludes that broadband communication might be the network of communication for the future.

Hamnes, K., Nordby, K. & Anderson, D. (1990) Testbed for User-System Interaction
The report describes a simulation of user interfaces to a videophone. The project has used a UNIX-workstation and the X-Window software for the simulation. The results from tests have led to several suggestions of improvement and also of suggestions for the creation of a general multimedia interface where videotelephony is one of several integrated functions. The tests consisted of presentation of the simulated system with a brief presentation of the basics of the system. The subjects were asked to perform certain operations as pressing buttons etc in a simulated interactive dialogue with the system. The subjects were then interviewed about the problems they had experienced.

Hampshire, B. & Brunér, C.J. (1987) Tillgång till telefonkatalogen för personer med vissa funktionsnedsättningar. [Access to the telephone Directory for Persons with Certain Disabilities]
This report concentrates on the presentation of different database techniques as well as speech synthesis techniques in order to make telephone directories accessible for people with disabilities.

Hayashi, N. & Tanimoto, Y. (1984) The Present State of Telephone Development in Japan
This is a state of the art report from Japan. It describes the history of telecommunication in Japan since 1952. It concentrates on the latest development of interest, push button technology and the all electronic telephones for instance. The devises are described in technological details. A part of the report concentrates on the development of specific teletechnology for people with disability, primarily for people with hard of hearing. However, some efforts have been made to assist elderly and motor impaired people. Finally a Japanese digital network corresponding to the ISDN network is described under the name of INS/Information Network System.

Klause, G. (1980) Telephone Set and Environmental Control Center - Vital Aids Disabled People at Home and in Medical Centers
The company SEL has developed a special telephone subset VITAL to meet the requirments of sensory and primarily motor disabled users. The author points out that disabled people often have a greater need for telecommunication and VITAL functions as an environmental control system and as an alternative keyboard with large keys and hands-free functions. The system also has a memory function.

Klause, G. (1981) Produktenentwicklung für Behinderte - dargestellt am Beispiel der Telekommunikation
This is a survey of telecommunication technology available for disabled people and it contains suggestions for development of future technology. The report is focussed on ergonomical aspects and strongly supports making telecommunication availabe for disabled people.

Knight N.H. (1981) Library Service to the Disabled. A Survey of Selected Equipment
This is a survey of different technological applications, making library services availabe for disabled people. Presentations of the following equipment are found in the survey: page-turners for motor impaired people, reading equipment using TV-screens for visually impaired people and telecommunications equipment for deaf people. Speech synthesizers are also described. The report contains functional as well as technological descriptions.

Kurakin, L.A. & Miller, V.A. (1974) (Télévision Appliguée) In Russian.
A report on different types of technical application using television technology including the description of a running videophone system and a system for meteorogical weather analysis and information dissemination and also television as a technical aid of education for blind people through CCTV systems.

Lindström, J.-I. (1988) Inventory of ongoing Projects
This report gives a picture of the visions and ideas for the 90's in the field of disability and telematics and is a project catalogue of ongoing activities in Sweden and in the other Nordic countries and some European facts. The report is formed like a directory with literature references and addresses and constitutes a baseline report.

Lindström, J.-I. (1989) Om telematik och handikapp under 1990-talet [Telematics and Disability During the 90's]
This is a review of tendencies and ambitions regarding the development of telematics for different groups of disabled people in Sweden and in the other Nordic countries. The report is a project plan for the future.

Several of the ideas presented in the report have been realized during the last few years.

Lindström, J.-I. (1990) The Use of Picture Communication for People with Disabilities
This review of different applications for visual communication is concentrating on broadband applications in Sweden and giving examples from the cooperation within the RACE project 1054. The report gives a short history of development in broadband technology and gives examples from the needs and experiences of different groups of disabled people, regarding remote picture communication. The author also gives an economical analysis.

Lindström, J.-I. (Ed) (1991) Telematik och handikapp i arbetslivet [Telematics and Disability at Work]
Twenty case reports on information technology applications in work place rehabilitations for disabled persons. The cases are illustrating telecommunication applications in different countries. The Nordic countries as well as the US are represented. The primary aim of the report is to show that telematics can be used to create well functioning work places for disabled people. Many disabled people have a job, mostly because they have access to good telematical applications. The main solutions presented in the report are either for visually or motor impaired persons.

Magnusson, M. & Brodin, J. (1993, in preparation) Virtual Reality and Disability
This report gives a presentation of the concept "virtual reality" and its relation to disability. The report contains information about the few projects in process in this field and also a list of general literature references on virtual reality. Most of the activities for people with disability exist in the US. The report contains several ideas for the future concerning different areas of disability.

McEwan, J. (1991) RACE projects: TUDOR and APPSN COST 219.
The two closely related projects from the frame project RACE are presented. TUDOR was an information retrieval and dissemination project where one of the aims was to create information structures for designers and developers of technology. The project would enable developers to invent special technology for disabled people thus including necessary constraints and conditions in development of everyday technology. One aim of TUDOR was to create a database with information on disability. Another was to create a study of the attitudes of elderly and disabled people towards tele technology.

APPSN was a project with the aim to pilot the use of videotelephony among disabled and elderly people. Seven countries created a pilot study where most of the people involved were hearing impaired or deaf people.

Mehnert D. (1982) Fernsehlesegerät für Sehschwache Nachrichtentech [Reading Aid for Visually Impaired Persons].
This is a description of a TV-based reading aid. The report states that glasses are not always enough to give sufficient enlargement of text. A short description is given of the system which permits three degrees of enlargement. The system has been evaluated by technicians and teachers and the results indicate that it can be produced in an economical way.

Naiman, D.W. (1988) Telecommunications and an Interactive Approach to Literacy in Disabled Students
This is a report on the use of different telematic interactive systems such as electronic bulletin board systems for disabled students to stimulate interaction, reading and writing. The report describes three different projects where telecommunication was used to stimulate, train and assess the abilities in reading and writing. This has been done on the basis of a specific model which integrates telecommunication with social activities. The group of disabled people participating in these projects were deaf, mentally retarded, dyslectic and emotionally disturbed. The results showed that the students who communicated with a peer with mature writing and reading skills were the ones who improved most of all.

Newroe, K. (1991) Telecommunication Technologies To Deliver Assistive Technology Services
This is a report on the use of telecommunication as a training and information tool, mainly directed as a provision tool for disabled people. Many different types of telematic services are described, computer conferencing and interactive television for instance. A special consumer project from Maine, USA, is described as well as a case report. At the end of the paper a glossary and a list of references are included.

Overby, C.M., Myer, T.H., Hutchison, J. & Wiercinski, R. (1978) Jobs to Disabled Persons via Computer-Telecommunications Technology
This report presents different ways of distributing jobs to disabled people through the telephone network. It analyzes the structure of modern society, concentrating on a description of the different technologies of telecommunication. The regulations and laws of the American society regarding work possibilities for disabled people are described and examples of case studies of the difficulties for different groups of people are given. Finally there is a list of problems and possibilities related to the technology which is bases on an analysis of human factors resources needed to develop good technological solutions.

Roos, B. & Sandén, P. (1988) Varseblivning av larm för döva, hörselskadade och dövblinda.Två förstudier [Perception of Alarms for Deaf, Hearing-Impaired and Deafblind, Two Pre-studies]
This is a report consisting of two papers against the background that different organizations and official bodies have decided to support activities in the field of alarms.

The first paper is defining future possibilities and limitations of present technology for alarms and perception. It includes a list of available technology. The second report is a prestudy on disabled persons in disaster situations and describes in what way the risk groups are influenced and the necessary actions to be taken.

Sasaki, Y. (1975) Current Trend in Customer Telephone Service
This is a brief report from a Japanese telephone company NTT describing the history of telecommunications in Japan, concentrating on the history of the company NTT, established in 1953. The report contains figures on the telephone use in Japan during this century and also describes current trends in technological development, concentrating on the development of new services such as the push button telephone or the pay phone. At the end of the report a summary of services for disabled and elderly is given.

Thedick, H. (1977) Adaptive Multipath Equalization for T.V. Broadcasting
This is a description of a new technique for broadcasting captioning for the deaf, inspired by the Captioning for the Deaf System developed by the PBS/Public Broadcasting Service. The new technique is defined as a multipath equalization system with different channels for text and picture where the text is equalized. The report states that equalization need not be restricted to data but could be applied to the television picture as well, creating a more cost-effective system which could be developed on a commercial basis.

Tronconi, A. & Billi, M. (1990) New Technologies for Physically Disabled Individuals
This is a review of available communication techniques for severely motor impaired persons with communication disorders. The report includes presentations on input and control systems like head-gazer-systems and symbol languages, output systems like speech synthesis. A presentation of different microcomputer environments is also included. A general model for an optimal system is discussed. At the end of the report there is a presentation of telecommunication possibilities using BLISS-symbols and a special BLISS II-computer code.

Walvick, E.A. (1991) Telecommuting - Technology in the Home, World Congress on Technology
The paper discusses developments in the telecommunication industry providing for improved, economical access, and how the telecommunication technology interacts with computer developments such as multimedia, distributed computing and video compression to make remote work available and closer to traditional work. The paper describes different methods used at the company NYNEX. How to bring more bandwidth to the individual and to homes. Special interest is given to the needs of disabled people.

Wannemo, P. & Brorsson, M. (1990) Att ringa - Telefonen som handikapphjälpmedel [Making a Call - The Telephone as a Handicap Aid]
This is a catalogue of different telephone communication aids available today, including comments on methodology and application. The catalogue is based on an inventory project, running a survey among different companies and public technology centres for the disabled in the area of Stockholm. Every piece of equipment is described accordning to its experienced use for a specific type of disability application. The catalogue covers most of the technology available at the moment in Sweden.

Yamagami, I. & Ohki, Y. (1979) Bone Conduction Telephone Tokyo
This brief report from a Japanese telephone company NTT is describing a bone conduction telephone for people with hard of hearing. The handset of the telephone contains a vibrating element which can be held in pressure contact with the bony structure behind the ear to send vibrations through the bone to the auditory nerve. An amplifier is also provided as well as three different frequency responses.

Yamagami, I. & Oshima, H. (1975) Customer Equipments for the Handicapped and the Aged
This is a report from the Japanese telephone company NTT describing their development for disabled and elderly, starting with an attendant console and a dial indicator for the blind. The report also concentrates on a telephone set for the hard of hearing and an emergency telephone for the elderly. The telephone set offers different volumes of speech and reception and a light indicator. The emergency set offers recording possibilities and direct phoning possibilities in case of need of immediate telephone contact.

Yamagami, I., Nakajima, N. & Sakamoto, M. (1981) Customer Equipment for the Handicapped and the Aged
This is a report from the Japanese telephone company NTT describing their welfare work, divided into three areas
- Special telephone installation and monthly fees reduction measures for the aged and the handicapped

the aged and the handicapped
- Development of various customer equipments for the aged and the handicapped
- Improvement on pay telephones so they can be used by the handicapped
The rest of the report describes all the different types of equipment that have been developed by NTT as for instance the Silver Phone, the Rotary Dial Indicator for the Blind and the Bone Conduction Telephone.

5. TECHNICAL ASPECTS ON PICTURE TELEPHONY

In this section some general references on picture telephony with an emphasis of technical information will be presented. Some of the references have no connection with disability, but are of general interest. A total of 18 references are included.

The main technological trends today are:

a. Using multimedia cards in personal computers, integrating the possibility to send (moving pictures) with the rest of the desktop facilities of the computer. Many of these cards operate on analogue networks, using different sorts of compression techniques and resulting in limited movement and size of the picture.

b. The development of specific videotelephone equipment, using broadband networks (mostly ISDN), giving the possibility of transmission speeds of 64 Kb/s and higher.

Blohm, W. (1990) Videotelephony with High-Resolution Transmission of Documents. In R. Marion (Ed.) Human factors in Telecommunication. Proceedings from the 13th International Symposium. Torino.
Two videotelephone systems were compared, one with high resolution and the other one with conventional monochrome TV quality. The study finds that the high quality system increases the picture quality as well as the satisfaction of the user with the videotelephony. It is predicted that those results will offer more effective work. A total of 40 subjects participated in the evaluation. The tests evaluated recognition of small details as well as an overall view of documents.

Cotanéa, P. & Deveault, M. (1987) Home Networks and Digital Audivisual Terminals
This is a report on the growing possibilities of home electronics. Five different home networks are defined - video/TV, audio/radio, home alarm, remote control systems and telephone. All the networks tend to become interconnected. The report classifies the services and analyzes the requirements and constraints of the different networks. There is a discussion around the best time division transfer technique - synchronicity

or asynchronicity. A model is proposed to create a usable and affordable home network with two examples - an ISDN STD compatible home network with a star topology and the Préelude home network: ATD and bus topology.

Coudreuse, J.P. (1987) Digital Picture and Videocommunication Networks
This is a historical, economical and technological description of picture communication using digital technology. It gives a perspective on the future where the goal is to create high quality transmission in a large digital videocommunication network.

Duffy, T. (1992) Videoconferencing: A Market in the Making?
This is an analysis of the present and future market for videotelephony and conferences, giving a brief introduction to the technology itself, explaining terms like "Codec" etc. The report speculates on future multimedia desktop communications systems which already seem to be a reality.

Faber, D., Meiers, Th., Seyferth, A., & Graveman, R. (1991) Additional Advantages of Motion Pictures for Information Acquisition. In R. Marion (Ed.) Human Factors in Telecommunication - 13th International Symposium, Torino)
This is a presentation of a project at the Heinrich Herz Institute where they experiment with the inclusion of motion picture facilities into a desktop multimedia system functioning over a broadband network. The project recognized the difficulties of transmitting moving videopictures over a narrowband network and intended to evaluate the differences of multimedia interaction with or without moving pictures as additional support. Eight experiments were conducted and almost equal results were found regarding the experienced learning effect between experiments with or without moving pictures. The experiments will evolve into investigations of movement properties or other more complicated elements of communication.

Fahlén L. (1991) The MultiG Telepresence System
This is a part of the Swedish effort to build a MultiGigabit broadband telecommunication system (see also Pehrson & al) whereby it would be possible in the future to transmit large information volumes - pictures, sound, text etc. The word Telepresence is often used to denote a multimedia presence within a network. Telepresence is in reality a virtual reality application where it is developed high level protocols for distributed applications and 3D graphics languages.

Guichard, J. & Nasse, D. (1987) Digital Image Coding
This is a description of digital image coding methods developed during the last years. Different methods are described and compared and the report

discusses different compression techniques for ISDN visual communication and videoconferencing.

LeContellec, M., Morin, F. & Richou, F. (1987) Thin Film Transistors for Driving Flat Liquid Crystal Displays
The technique behind flat LCD's is described and different methods of avoiding the problem of insufficient contrast and poor viewing angle is discussed. Examples of research in new technology are given, especially research on amorphous silicon for solar cells. The article describes the making of a thin plate transistor using hydrogen amorphous silicon on a glass substrate and the realization of a flat liquid crystal display. A project CLEMATITE was created for the work and the end result was a flat minitel terminal.

LeNoane, G. & Boscher, D. (1987) Evolution of Passive Components for Videocommunication L'Écho de recherches
This is a description of the current state of the art of optical fibres, cables, connector systems and couplers. The report states that present fibre systems might not be usable in local videocommunication networks. The present technology will probably have to undergo radical changes in the future. Different types of cables, manufacturing companies and techniques are presented. Connectors and couplers are presented separately.

Mathisen, K.-O.(1990) Billedkommunikasjon i telenett [Picture Communication in Telenetworks]
This is an overview of possible visual remote communication methods. The report has several suggestions as a conclusion for the Norwegian Telecom as an action policy. The report contains an economical and a technological analysis as well as a description of the different technologies involved.

Melwig, R. (1987) The Day After Tomorrow: High Definition Pictures
The report analyzes the new development of television technology and the needs for improved broadcasting pictures. Mainly different actors of the industry are stressing the needs for better picture quality. Different aspects are described and possible technical solutions as well as existing hardware. The problems of finding common standards are discussed and finally a European approach is described where the D2-Mac Packet System is the dominating one.

Mühlbach, L. (1990) Procedures for Convening Multipoint Video-conferenses.
The report describes different procedures for the creation of broad band based Multipoint videoconferences. The medium seems to be ideal for multipoint conferencing, particularly in workplace conferencing. A study in human factors aiming to develop user-friendly procedures for the use

of multipoint video conferences is reported. Two different set-up procedures or systems were evaluated under laboratory conditions, including procedures for establishing sub-conferences. The results show that the convening procedures for multipoint conferencing should enable a dynamic extension of the number of subscribers per direct dialling.

Møllerbråten, B. (1991/a) The Development of Videotelephony
The report gives a historical perspective of videotelephony, describing different global experiments and standards from the early 20's and onward. The report stresses that the development before ISDN has been too expensive to offer videotelephone systems to a wide public. However, videotelephone systems were used in Germany in the thirties, in the US in the fifties and in the USSR in the sixties. The main problems have been the technical complexity, the costs and limitations of the network and the needs of the user. Today, coding and compression technology offer cheaper and less complicated systems and several user groups have experienced videotelephony to be of positiv use. Standardization will make technology more available.

Møllerbråten, B. (1991/b) Videotelephone Development in Norway.
The report gives the history of videotelephony in Norway, concentrating on the usage and evaluation of the Tandberg Videotelephone from the first research work in the early 70's. The Tandberg videophone is described in detail including design specifications and a short analysis of the expected price development of this technology in the future. The report also tries to define an ISDN videophone as a device containing codecs etc, making it a new integrated piece of technology.

Netravali, A. N. & Limb. J.O. (1980) Picture Coding: A Review, Proceeding of the IEEE.
This is a presentation of different techniques used for encoding and transmission of pictures and graphical material. The report covers different techniques in a systematical way with a technical description of each technique. Three systems are described in detail as typical for available and future systems. The prediction for the future is a intense development with several new concepts emerging. Concepts based on integrated circuits and functioning in a variety of contexts. The report is concluded with a brief historical overview.

Pearson, D.E. (1985) Visual Communication at Very Low Data Rates
This is a presentation of a picture transmission method with a maximum speed of 19.2 Kb/s where it is postulated that the important features from a grey-tone picture can be extracted and presented on two-levels. The significant features of the hand, the face etc can be filled out with cartoon lines presenting a rough but understandable way of presenting signed language.

Schröck, W., Weßelmann, H.-J. & May, F. (1988) Bildtelefone - Fernsehen statt Fernsprechen [Picture Telephones: Television instead of Telephony].
This is a technological analysis of the inherent possibilities for videotelephony through the ISDN network, exemplified with a prototype videotelephone from the AEG research institute, described in detail. The report gives the historical background of the development of the ISDN network in Germany. It describes the qualities and limitations of picture transmission and possible services available through the ISDN-network using videophones. The report contains no information about any field trials of the telephone.

Telese, O. & Zarone, G. (1981) Video Hybrid Coding by Picture Domain Segmentation
This is a report on the use of a coding techique which makes it possible to reduce the information necessary to transmit in the video-picture. Only the changing element in the picture frame is coded and the rest is copied from the earlier picture. The technology uses spatial correlation through the 2-D intraframe transform and temporal correlation through interframe DPCM. The technology has been tested and the report contains examples of picture quality.

6. ERGONOMICS, ENVIRONMENT AND PICTURE TELEPHONY

6.1 Adaptation of equipment, general aspects

Several references in this chapter are related to the RACE application pilot project 1054 on videotelephony for people with special needs. RACE is a European cooperation project in the field of broadband communication and APPSN 1054 was a field trial project where the aim was to develop videotelephony systems which should be evaluated as communication tools for people with special needs. RACE has developed into its second stage since 1992 - RACE II. In this second part, a project Tele Community has continued the aims and ideas of APPSN. Seven references are included in this part.

Clarke, A.M. & Gili Manzanaro, J. & Leppänen, J. & Papa, F. (1990) Usability of Videocommunications in the RACE ISSUE Project
This is a short presentation and analysis of usability aspects of the RACE 1065 project. Three sub-projects are presented in the planning stage. No definite trials are presented. The paper is an action plan with directions and initiatives presented as a result of the analysis.

Prussog, A. (1990) User-Friendly Multiservice Broadband Terminals: Applications and Design Considerations
This is an evaluation comparing two different interfaces to experimental multiservice, multimedia terminals, including video communication. The reason for the investigation was that new types of technology made special demands on the design of the user interfaces. One interface was an icon based direct - selection or - manipulation interface and the other one was based on generic functions, using commands for specific functions. Both were compared to a more conventional interface and in all cases complex applications were evaluated. The results showed that both types of interfaces have clear advantages to traditional interfaces, especially regarding the manipulation of complex sets of commands. The direct manipulation method seemed to be advantagous to naive users and the generic method seemed easier for accustomed users.

Ussher, M., Wilson, F. & Welbank, M. (1990) Evaluation of Videotelephony Support Service for People with Special Needs
This is a report from the RACE project 1054. A plan to evaluate the use of videotelephony by elderly people in the form of a case study. The report states that the main part of the skill in planning evaluations involves finding a method to suit the particular circumstances of the evaluation. A concrete description of the context of the evaluation, a description of the components of the plan and the necessary knowledge to use the plan is exposed. An appropriate representation for the method is discussed.

Welbank, M., Ussher, M. & Wilson, F. (1990) Requirements for Videotelephony Terminals for Support Services for People with Special Needs
This is a report from the RACE project 1054. It contains a description of the method for requirements capture used in the project for five different systems. Each system is applying a different type of technology. Their significance for interface design is discussed which means that specific needs of different groups of disabled people are described. The intention is that the system should be used in a home environment.

Wilson, F., Welbank, M. & Ussher, M. (1990) Including Customer Requirements in the Design and Development of Telecommunications Services
This is a report from the RACE project 1054. A discussion about the inclusion of customer requirements into telecommunications design work, stressing the necessity of more informal methods. There are many difficulties in generating an appropriate representation of human factors issues in design. A more user oriented approach is suggested in the report, which also models a method directly from the structure and aims of the RACE project.

Östberg, O. & Renhäll, P.O. (1988) Techniques for Ensuring that the Videophone User is Correctly Positioned with Regard to the Camera

Östberg, O., Lindström, B. & Renhäll, P.O. (1989) Contribution of Display Size to Speech Intelligibility in Videophone Systems
The research team has investigated the ergonomical aspects on video-communication. These two reports are examples of the relation between position and physical characteristics of the camera and the intelligibility of the transmission. Report 1 stresses that the position is important to give clear and easily understood transmission. Report 2 stresses that a larger display seems to give better understanding of the received message.

6.2 Social aspects

New telecommunication technology will contribute to social and sociological changes. In this section there are several examples of reports and evaluations which describe and analyze the different changes for the future. The reports concentrate on the effects of visual distance communication. A total of ten references are included.

Andersson G. (Ed) (1988) Omvälvning i datavärlden [Great Changes in the Computer World]
This is a report on general telecommunication facilities in Sweden and the necessary social and economical changes brought about in the infra-structure. Little of the content specifically deals with picture communication. The report concentrates on services available today. However, great importance is given to the changes in society. Changes that information technology in general and telematics in particular has brought about.

Forchheimer, C. (1988) Utsträckt kommunikation [Extended Communication]
This report describes how new technology has extended our senses and our experiences of communication at great distances. The part concerning videotelephony describes several prototypes and existing videotelephony systems. Most systems use slowscanning black and white picture telephone systems such as the Mitsubishi VisiTel system or the Panasonic Picture Phone. The report gives a concise history of videotelephone trials in the western world.

Johansen, R. & Forchheimer, C. (1984) Telemöten i USA [Telemeetings in the US]
This report is an analysis of the use of various teleconferencing systems, with or without visual support by American companies. Different user aspects are described and a review of the different types of messages which can be transmitted is presented. There is also a state of the art report on videoconferencing. The report also gives a short historical perspective but concentrates on an economical analysis from a corporation perspective, briefly analyzing results and possibilities regarding different telematical methods.

Kenny, S. (1991) Home Delivered Training Project
This is a report on a vocational distance training and educational project where a group of disabled people attend a business course at a distance. The goal has been to test different methods of remote training and to attain standards required for employment based on computer technology. The participants have used databases and computer network communication. The project took place in Ireland and the main goal was to make disabled home workers a valuable asset to society.

Kristiansen, T. & Møllerbråten B. (1991) The Future
This short summary about Norwegian videotelephone experience, give a concrete perspective on past, present and future development of videotelephone technology, stressing the need for high standards and good evaluation within the European framework.

Mathisen, K.- O. (1991) Remote Surveillance
Two examples are given of the use of videophones in remote surveillance. One example is of a closed system which could be used as a private security system and the other of an open system in a public area where users can experience the scenery of a given part of a city for instance, by using a distance monitored videotelephone. The author concludes that videophones could be used either as "teleaction"-tools or as passive surveillance tools.

Nordby, K. (1991) Human Factors in T. Kristiansen & K. Nordby (1991) (Eds) A Window to the Future. The Videotelephone Experience in Norway.
The author stresses the need of humane interfaces, good standardization and easily understood metaphors for the communication process behind the concept of videotelephony in particular or picture based or visual distance communication in general. Ergonomical aspects are also evaluated. The report analyzes the different parts of videophone communication into 14 considerations until videocommunication is generally available and ergonomically acceptable. The basic considerations are:

- Make sure that the user can figure out what to do
- Make sure that the user can tell what is going on

Samuelson, K. (1983) Videokonferenser och tillämpningar av bredbandskommunikation i Nordamerika [Videoconferences and Applications of broadband communication in North America]
This is a report of applications from the USA, containing information of trials from several companies and corporations. Some of the information is still valid although some of the 10 year old predictions have failed. The report, however, gives a good historical perspective. It also shows that broadband services were available as early as in the 70's on an experimental basis. Most of the experiments were not interactive in the sense that they offer person to person interaction. Rather, videoconferences were used as a kind of public information meetings over the telephone network.

Utbult, M. (1989) Lära mer i arbetet med bilder över telenätet [Learning More in the Work with Pictures over the Telenetwork]
This is a description of four trials in different professions where distance based picture communication was used as an education and advisory support at different work places. The four professions were dental care, industry, farming and teacher's education. The methods used were videoconferencing, exchange of X-Ray-pictures on the network and interactive broadband communication. The main conclusions are that a good quality of the sound is important and that human direct contact is of great importance.

Utbult, M. (Ed) (1992) I en röd liten stuga nervid sjön vill jag jobba [I want to work in a Small Red Cottage by the Lake]
This is a report on the possibilities of home-working and teleworking, with examples from the Swedish country side. Small high tech companies can exist in the far north due to good tele communications and large companies can distribute part of their work to different places. Four large corporations and their remote communication policies are presented. A special part describes the Tele Cottages, a concept where many companies can use the same staff. The population structure of Sweden is well suited for telecottages and several do exist all over the country.

6.3 Psychological aspects

Little work has been done in the psychological field regarding picture-based distance communication. We have only found one report analyzing this situation.

Mochizuki, K. (1990) Psychological Analysis of Human Behaviours in Communications
This is a report on the psychological analysis of human behaviors in general communication. The report shows that fundamental communication taking place in our minds, is the communication between the consciousness and the unconsciousness. Several types of telecommunication, including videotelephony, are analyzed according to this principle. Remote communication is viewed upon as any other type of interactive communication between individuals.

6.4 Medical aspects

Medical aspects on picture based remote communication are found in several reports. A popular application is to analyze X-Ray pictures transmitted from a distance over various networks. The following reports are in reality reports from (planned) frame projects containing several medical applications of remote communication.

Gisslén, L. (1990) Telemedicin i Jämtlands Län - Projektplan [Telemedicine in the County Council of Jämtland]
This is a plan of a Swedish version of the Norwegian Telemedicine project (see Nymo 1989). The project describes several applications using picture communication on the broadband network and a UNIX computer network of one specific county council involved, for instance distribution of X-Ray pictures and distance therapy for people with Aphasia. The latter project was planned to involve the use of personal computers.

Nymo, B. J. (1989) Telemedisin i Nord-Norge [Telemedicine in Northern Norway]
This is a presentation of a project where doctors and health centers transmitted medical information on an internal broadband telenetwork making diagnostics possible. The most interesting item of the trials was the high quality of the X-Ray pictures transmitted, making it possible to make exact and clear remote diagnostics of for instance hæmmorhages or bone fractures. A similar project was planned and reported by Gisslén (see above) .

7. EDUCATION AND PICTURE TELEPHONY

Several reports describe various experiments and methods for education. In this section five references are included.

Kristiansen, T. (1987) Etterutdanning og ny teknologi [High-School Education and New Technology]
This is a report on technological possibilities in distance education, concentrating on telecommunication, for instance teleconferences and modemcommunication. The report is a plan depicting several project ideas and analyzing the inherent possibilities of broadband based technology for education. The report is concentrated on graphic communication and is mainly discussing adult education in different workplaces or companies.

Kristiansen, T. (1989) Fjernundervisning i fiskeindustrifag - forsøk med toveis lyd/bilde kommunikasjon over 2 Mbit/s [Distance Education for Fishermen Using Videophones]
This is a report of a project in northern Norway, involving fishermen in several remote towns. This area of Norway is a very desolate area where distances between people are immense and where everyone is already depending on modern communication technology. The videophone was used to train the workers in remote places from a central studio. The project was the very first Norwegian experiment using two-way videotelephony in Norway and was based on the assumptions of the former report.

Kristiansen, T. (1991) Distance Education
This is a general presentation of possible use of interactive videotelephony in remote education and a more specific presentation of several of the projects that the Norwegian Telecom has been involved in. A special emphasis has been on projects in the northern scarcely populated counties. The report is an updated version of Kristiansen (1987) with integrated results from projects of the intervening years. The Tandberg videophone is used in this project.

Read, R. F. (1991) Video/Satellite Broadcast of Educational Programs for Technology Transfer to Persons with "Disabilities"
The Center for Computing and Disability in New York have broadcasted by satelite a series of instructional video programmes all over the eastern part of the USA, specifically aiming at disabled people. The viewers were many and the report advocates this type of electronic broadcasting to reach large audiences instantaneously. The main goal of the work was to establish a system to transfer technology. Interpersonal interaction was not the main goal of this project.

Simpson, H. & al (1991) An Experimental Two-Video Teletraining System: Design Development and Evaluation
This is a report on an educational experiment in the USA where a system for two-way education by video was developed. The report contains description of the way education by video was developed. The report contains a description of the developmental work and also of some results from pilot trials. The users were the Navy and the system tied two class-rooms together by a land-line. The technology involved is described in detail as well as a cost analysis. A total evaluation of the project is also included.

8. DISABILITIES AND PICTURE TELEPHONY

In this chapter the references are divided into sections with regard to disability. In some cases we have chosen to categorize the references with regard to their primary content and disability, but sometimes they could have been under more than one heading. People with mental retardation e.g. often have additional handicaps, but are presented according to their main disability which is mental retardation.

A total of 78 references have been included in the report. They are categorized as follows: General references (5), mental retardation (12), motor disability (3), hearing impairment (36), speech and language impairment (13), visual impairment (3) and elderly (4).

8.1 General references

Leppänen, J. (1991) Picture Quality
The report is describing the need for videocommunication and discusses the quality of transmission. It defines the necessary demands for picture quality. It gives a general description of the problem area and defines necessary testing methods and goals, both objective and subjective. The report sums up the case for videotelephony.

Lindström, J.-I. (1991) The Situation in Sweden with Regard to Picture Communication for People with Disabilities
The report gives a brief description of the practical evaluation work that has been done in Sweden, regarding the use of picture communication by disabled users. The main experiences have been from telefax interpretation services for blind users, still picture telephony for mentally retarded persons and 64 Kb/s videotelephony for hearing impaired users. The most recent experience comes from a 2 Mb/s trial for deaf people.

The report mentions plans to use videotelephony for speech impaired users.

Pereira, L. M. (Ed) (1993) Visual, Mental Impaired, Elderly People and Picture Communication.
This report is the results of a mini-trial conducted in the European project RACE 2033, TeleCommunity. Application of videophone services were identified and described. Learning and training at distance, remote delivery of expertise, monitoring and remote care are discussed. The target groups were mentally retarded, visually impaired and elderly. In total 55 people with disability and six experts participated in the project.

Plompen, R. (1991) General Overview and Development of 64Kb/s Videophony
The report contains different aspects of 64 Kb/s videotelephony, describing different types of applications, different capacitites and the possible market. It defines the concept of videotelephony in terms of audiovisual communication, relating it to other forms of telecommunication and defining the different types of data transmitted. It also defines the goal as "picture communication for common use"and the mission "to fulfil elementary communication needs" and "to use cognitive capabilities".

Reefman P. (1991) Introduction to the Activities of Action Project 5 (AP5)
COST 219 held a seminar on videotelephony and disability in the Hague on February the 12-13th. 1991. It resulted in a report and this is the preface to this report. It states that standards in the field of compression and transmission of pictures are well on their way and that many 64 Kb/s codeks will be available in the near future but that their performance will differ so that is will be necessary for different groups of disabled people to evaluate them carefully to find the one most suitable to their specific needs. The seminar contained many presentations of ongoing propjects in the field and they will be presented separately.

8.2 Mental retardation

To use a telephone may be difficult for many people with mental retardation due to cognitive, operational and sociorelational factors. Being mentally disabled means having an intellectual impairment which affects the ability to understand concepts connected with time, space, quality, quantity and cause. A person with mental retardation has a more concrete concept of reality than normal. The difficulties are related to the way perception, guiding and symbolizing of the thoughts are structured and to

memory functions. Few studies have been carried out regarding people with mental retardation within the telecommunication area.

Berglund, L.Å. & Bond, A. (1991) Telematik och förståndshandikapp [Telematics and Mental Retardation]
This is a report about different areas within technology for persons with mental retardation. In the report the authors discuss different possibilites to adapt technology to the individuals in order to diminish the effects of the disability and increase the possibilities to participate in society. They also speculate about the future to find out what technology can do to facilitate life for this population. In the report there are several suggestions of projects and activities in the field.

Brodin, J. (1992a) Telecommunication for People with Mental Retardation. Requirements and Services.
The objective of the report is to define the requirements and support services for mentally retarded users within the telecommunication area. The report focuses on population, definitions and classifications of mental retardation as well as implications of mental retardation in daily living. Support services as medical care, habilitation and education for people with mental retardation are also discussed. The importance of communication for people with mental retardation is emphasized and a plan to pilot the use of videotelephones for this population is introduced.

Brodin, J. (1992b) Still Picture Telephony, Videotelephony and Telefax for People with Mental Retardation.
The paper gives a view of new telecommunication technology for people with mental retardation and is based on a presentation held at the CSUN-conference in March, 1992 in Los Angeles. Four projects in the area of telecommunication were presented: 1). Evaluation of still picture telephones for children and adults with moderate mental retardation. 2). Still picture telephones for adults with profound mental retardation. 3). Telefax communication for adults with moderate mental retardation. The participants in this project had a non-verbal communication and used Pictogram symbols in their daily living. 4). Videotelephony, i.e. transmission of moving pictures, at day centers for adults with moderate mental retardation. The results from the above studies are positive and show that if technology is adapted to people with disability, technology will increase their possibilities to develop and participate in social life.

Brodin, J. (1992c) Stillbildstelefon som stöd vid kommunikation. [Still Picture Telephones as support in communication].
The paper was presented at a Nordic conference in March 1992 in Oslo. The main topic is based on an empirical study on still picture telephones for people with mental retardation with the aim to evaluate remote telecommunication with picture telephones. The results show that still

picture telephoning facilitate communication as it gives both visual and auditiv information simultaneously. The frequency and continuity of the telephone use increased by time and the motivation and will to use the telephone increased. The pictures sent were also more relevant and functional which means that the participants chose the pictures with care and decided what they wanted to transmit.

Brodin, J. (1993). Telefax Communication for People with Mental Retardation. (Orig. Telefax för personer med utvecklingsstörning).
This study started in 1991 as a result of the studies with still picutre telephones for people with mental retardation. The aim was to find out if telefax communication would facilitate and support communication and if telefax communication would expand the social network of the participants. Five adults participated in the project. The results show that the ability to take initiatives increased and that the participants improved the ability to use telefax. The telefax communication also increased their independency and was a good support for developing their social relations.

Brodin, J. & Björck-Åkesson, E. (1991) Evaluation of Still Picture Telephone for Mentally Retarded Persons. (Orig. Utvärdering av stillbildstelefon för förståndshandikappade).
The focus of this study has been to evaluate the benefit of using a visual telecommunication system. Three children and five adults with moderate mental retardation have used a Panasonic still picture telephone for five months. The study has been carried out at day centers and at family homes. The study is based on interviews with parents and staff, telephone protocols, diary notes and video observations. The results show that still picture telephones can facilitate communication and increase the possibilities for social contacts. Still picture telephones can also be regarded as a technical aid for people with disabilities.

Brodin, J. & Björck-Åkesson, E. (1993). Still Picture Telephones for People with Profound Mental Retardation. (Orig. Stillbildstelefonering för personer med grav utvecklingsstörning, 1992)
This study is a continuation of the study of still picture telephones for people with moderate mental retardation. The study focuses on people with profound mental retardation. Four adults at day centers participated in the project. The results show that the use of telephones for these people are not functioning in the same way as for people with moderate mental retardation. The most important issues seem to be the social and emotional aspects of telecommunicating.

Brodin, J. & Magnusson, M. (1992/a) Videotelephones and Mental Retardation. (Orig. Bildtelefoni och förståndshandikapp. En kunskaps- och forskningsöversikt, 1992).
This study is a limited literature study based on written material as well as

information received from a small number of databases within the area of picture telephony for people with mental retardation and closely related areas. The survey gives a good view of what has been done and what is going on in Europe within the field of videotelephony.

Brodin, J. & Magnusson, M. (1992/b) Still Picture Telephones for People with Aphasia and Mental Retardation.
The report is a presentation of two studies within the areas of telecommunication for people with aphasia and with mental retardation. The focus is on the empirical studies. A brief outline of the use of still picture telephones for picture based distance communication is presented, based on the two studies. A description of related work in Europe is also presented.

Holand, U. & von Tetzchner, S. & Steindal, K. (1991) Two Field Trials with Videotelephones in Psychiatric and Habilitative Work
The report presents results from the use of videotelephony as a supervision tool in sign language instruction for autistic children and their families and in supervision of general psychiatric work. All the supervision was concentrated around work with autistic children. The ordinary telephone, however, was used to arrange meetings and as a general administrative tool. Most participants expressed satisfaction with the videophone as a supportive tool and the report concludes that this type of technology is valuable in respect of giving equal expert supervision to scarsely populated areas.

Pereira, L.M., Matos, M.G., Purificaçao, M. J., & Lebre, P. (1991) Picture Communication and People with Mental Impairment
This study is an empirical study of videotelephony in an institution. The aim was to find out if people with mental retardation could easily use picture telephones connected to a network and to find out if picture telephones could be used in learning situations. Fifteen childen and youngsters between 8 and 23 years participated in the project. The results show that the videotelephony may be used to give education to children despite that they are absent from school. The study was part of the European project TUDOR.

Pereira, L.M., Matos, M., Purificação, J., Lebre, P. (1992) Videotelephony and People with Mental Impairment
This is a report on a short field trial using closed circuit television as a video-phone communication aid for mentally retarded adults and children in Portugal. The trial was a part of the European RACE-project TUDOR and it concentrated on the aspects of using direct video-communication as a person-to-person tool in a learning situation. The two main scenarios investigated were, the learning situation where the teacher is at a distance and a situation where the subject can study his or her body posture using

video in order to attain greater self awareness. The main result from the project was that the users experienced that video-communication gave a better control of the learning situation.

8.3 Motor disability

Although most experiments in videotelephony for disabled people mention people with motor disabilities and conclude that their needs of distance communication is great, not too many direct experiments concentrate on the problems of primarily motor disabled people. Two reports in Norwegian are excluded because their content is well covered in the two last reports of this section.

Pereira, L. Matos, M. Purificação, J. & von Tetzchner, S. (1991) Use of Videotelephones for Intervention and Independent Living
This report is based on three preliminary studies of the impression on disability intervention that will be made by videotelephony. The report defines intervention consisting of four different aspects. The videophone is described as a tool for team work and collaboration, supervision, distance education and support. Several examples are given as how videophone communication can be used to enhance intervention services. The report also gives specifications for videophones for different groups of people with special needs. e.g. people with visual disabilities.

Perälä, J. & Lounela, L. (1991) Videotelephone Based Support Services for Elderly and Mobility Disabled People
This is a report of a trial involving three Finnish cities using an analogue videotelephone system as a safety service and as a remote advice and guidance service. The technology used is standard technology and the trial takes place in the homes of the persons involved as a part of the public caretaking service. Most of the 32 participants in the project are elderly and a few have slighter disabilities. The pilot project was part of the RACE project 1054.

von Tetzchner, S. & Hesselberg, F. & Langeland, H. (1991) Supervision of Habilitation via Videotelephone
This report describes the use of videophones in the supervision of habilitation of children in cooperation between local institutions, the school psychologist's office and a central institution in Oslo. It was stated that the central institution could give valuable support and supervision to the local ones and that videotelephony would be a suitable supervising medium in general. The trial analyzed the results in terms of picture and communication quality and communicative content from a total of 15 sessions with an average length of 42 minutes. Some contacts during the time of trial were also made by ordinary telephone calls or through visits.

One of the results was that videophone supervision is superior to telephone supervision but inferior to "live" supervision.

8.4 Hearing impairment

This is the area where the most as well as the oldest experiments in the field of videotelephony are found. In all places where videotelephony has been evaluated as a tool for impaired persons, the main and first question seems to have been: in what ways could videotelephony facilitate the distance communication for hearing impaired and deaf persons.

Barbe, C. (1991) Videophone Images and Sound for Remote Communications with and Between Deaf Persons
This is a description of a feasability study performed by the CNET-group in Lannion on the needed quality of videocommunication for deaf people. The group has found that the information should be compatible to a narrow band which creates problems of compression. The study set out to design a system to evaluate the quality of communication of animated images associated with sound, for use by deaf people and to check the efficiency and comfort of the signal. The study has been performed under very controlled forms.

Delvert, J. (1989) Video Communication for Deaf People in their Working Lives
This is a report that has been the starting-point of the evaluation of 2 Mb/s videotelephone communication project between the Swedish cities of Västanvik and Stockholm. In the report the needs of deaf people are described as well as the necessary technical requirements for the project. The project was part of the European RACE application pilot project 1054 APPSN. The report is a planning report which has been followed by several recent presentations of the results of the work as part of the internal project information.

Dopping, O. (1990) Tests with Bit-Saving Video Communication for Sign Language and Lip Reading
The report describes tests with five different videotelephony systems from different countries with different techniques of compression and speeds. The main goal of the tests has been to assess the intelligibility of signing between deaf and hard-of-hearing people. A videotape with examples of signed communication was produced and distributed to evaluators for the five systems. Most of the systems were used in other European trials within the RACE project mentioned above. Pictures of the results of the transmission were distributed to the Swedish project leaders who investigated the quality of the pictures.

Dopping, O. (1991) Videotelephony on 2 Mbit/s for Deaf People in their Working Lives

This is a description of the Swedish pilot within the RACE 1054 project. The pilot uses 2 Mb/s videotelephony in a linked communication between two offices of the Swedish National Deaf organization (SDR), situated in two cities. The report is concentrating on the functional aspect of the pilot but gives a description of the equipment and the network used. The equipment consisted mainly of an amateur video recorder (with no recording part) and an ordinary domestic TV-monitor. A control unit was developed for the project with possibility to use the audio system. The system has been used both in direct communication between deaf users and as a tool between deaf and hearing users with help of an interpretor. The author concludes that deaf people may well need a whole battery of digital technical aids in the future of which a high bit ratio videophone may be the most important aid. For a more basic technological description, compare Nilsson (1990).

Foulds, R. A. (1986) Toward Telephonic Transmission of Sign Language for the Deaf

This is one of the first reports about a longitudinell project investigating different methods of telecommunication for deaf people, with a present field trial with a video card for a PC (personal computer) transmitting contours, making it possible to sign to each other over a distance. The technology is similar to the Valledge technology described by Whybray & al. Foulds and his research group is one of the few groups in the US who are working with videophones and disability.

Frowein, H. & Schouman, A. C. (1990) Videotelephony for the Hard of Hearing

This is a report describing the benefits of ISDN 64 Kb/s communication for the hard-of-hearing and also describing briefly the development of broadband communication and its relation to narrowband communication. In the report a laboratory trial is described and its results in terms of speech reception and perception. Specifications for applying a videophone for hard-of-hearing persons are also described and finally there is a plan for an application pilot as part of a European cooperation project.

Frowein, H.; Smoorenburg, G.F.; Pyfers, L. & Schinkel, D. (1991/a) Improved Speech Recognition through Videotelephony: An experiment with the Hard of Hearing

This is a report from a project indicating that videotelephony will be potentially effective in improving speech reception and recognition at a speed of 64 Kb/s and a frame rate of 15 Hz and that different types of spatial resolutions can be used. The results were based on three experiments with 40 persons participating. The trial consisted of audio-only and audiovisual presentation of prerecorded messages to

hard-of-hearing subjects and the percentage of correctly reported syllables was taken as a messure.

Frowein, H., Schinkel, D., Smoorenburg, G.F. & Pyfers, L. (1991) Improved Speech Reception through Videotelephony: Experiments with the Hard of Hearing
Published in IEEE Journal on Selected Areas in Communications, May 1991. The same content as the above mentioned.

Frowein, H. & Smoorenburg, G.F.,Pyfers, L. & Schinkel, D. (1991/b) Videotelephony and Speech Reading: The Effect of Picture Quality
This is a report on development of a method to assess readability of videotelephones regarding sign language. The paper describes an investigation based on three experiments prepared for the application of 64 kbit/s videotelephony as a communication medium for people who are hard-of-hearing. The experiments consisted of presentations of video recordings which were shown at different picture rate (images/second). Some specific aims were to confirm and measure the added value of audio-visual presentation for speech reception and to assess the suitability of 64 kbit/s video images as an adjunctive aid to speech reception. The authors conclude that frame rate is important and that the spatial resolution is of less importance.

Galuska, S. (1990) The Development of a Visual Telephone for the Deaf: Using Transputers for Real-Time Image Processing
This is a report on the work done at the Alfred I. duPont Institute (Foulds, 1986). It describes the use of transputers in the development of a videophone which could be used to transmit sign language for deaf people via the public telephone network. Compression and reductions techniques are described. With these techniques the main goal, transmission speed at a low k/bit speed, would be reached.

Kamata, K. (1992) Sign Language Conversation Through Videophone in ISDN
The report investigates the possibility of the use of videotelephones for deaf or hard-of-hearing people for conversation by sign language over the ISDN network. Deaf people have indicated that videotelephony is suitable as a sign language medium. However, the report lists several difficulties of technological nature which have to be solved before the medium is generally usable. Some videophones of the Hitachi brand (2*64 Kb/s) have been used in a few laboratory trials and a brief technical description of the videophone is included in the report.

Leopold, F.F. (1990) The Video Telephone Project at the Delft University of Technology

This is a poster presentation of a 64 Kb/s videocommunication project for 1992 and onwards consisting of eight sub studies:

- Encryption
- Videotelephony for hearing impaired
- Videotelephony via broadband telephony
- A consumer market-research
- Image quality
- The contribution of vision to speech perception
- Designing user interfaces of telecommunication systems
- User interfaces for telecommunication systems in organizations

Letellier, P., Nadler, M. & Nabramatic, J.F. (1985) The Telesign Project

The report describes a system of interactive videocommunication for deaf people in France. The system consists of an edge detector accompanied by digital compression coding. The report states that a minimum speed is 25 frames/second to make the pictures identifiable and a minimum definition of 128x128 points is necessary. The report classifies a series of edge detectors, based upon the position of the contour. Different coding techniques are reviewed and a psychovisual experiment is described in detail. The results make the foundation for a suggested design of a device in real-time. Finally the application of Telesign to closed caption TV programs for deaf viewers is discussed. The Telesign project is closely related to the work done in the US (see Foulds, 1986) and the technique used in the work described by Whybray and Hanna (1988).

Lo, T. (1990) Visual Telecommunications for the Deaf - A Case Study

This is a report on two experiments using videotelephony over a broadband network (64 Kb/s) and a common telephone network (9.6 Kb/s) investigating the transparency of sign language use. In the first experiment three options of decreasing resolution quality were evaluated in comparison with the use of face-to-face communication in a control group. In the second experiment a field trial using low-speed transmission was evaluated during one week. The results show that the experiences were positive regarding the quality of the transmission

Marion, R. (1991) A Service Pilot for Deaf Persons Through Videotelephony

This is an overall presentation of the RACE project 1054, involving seven European countries, concentrating on the Italian part of the project which exploits the 64 kb/s videotelephnony for deaf people on the public ISDN/IDN network. In the report outcomes of laboratory experiments and field trials are presented and every member countries pilot participation is

presented. Suggestions on the exploitation of service capabilities and telecommunication standards are given.

Marion R. (1992) A Service Pilot for Deaf Persons Through Videotelephony
This is a presentation of the European RACE project on broadband tele communication for people with special needs, concentrating on the Italian part of the project which exploits 64 Kb/s videotelephony on the public network. The purpose is to allow deaf people to communicate with each other using sign language and with hearing people through the use of a relay-service, giving access to different services. The report describes results from laboratory and field trials where different aspects of the communication situation have been evaluated. The intent is to make the service generally available for deaf people and to extend the evaluation to hearing-impaired persons.

Marion, R. & Schindler, O. (1990) A Service Pilot for the Deaf through Videotelephony
A report from the RACE 1054 project APPSN. The aim of the project is to design and develop a service trial for deaf people where the feasability of the 64 Kb/s network and existing prototypes of videophones are evaluated. A service centre will be established where two main types of services will be available: information and interpretation. In the report the videoterminals are described as temporal and spatial resolution where the spatial resolution is fixed.

Martin, M.C. (1990) Telecommunications and Hearing Impairment
A review of different methods of telecommunication for hearing impaired people. No specific presentation of videotelephony is included. The report is concentrating on text based communication and on different types of amplification techniques for hard-of-hearing people. The report gives a fundamental introduction into basic communication tehniques for hearing-impaired persons.

Møllerbråten, B. (1988) Demonstrasjon og utprøvning av 64 Kb/s bildekodek ved Ål folkehøgskole og kurssenter for døve [Evaluation of a 64 Kb/s Videophone at Ål's Folkhigh-school for Deaf People],
This report describes the project of videotelefony for deaf students at Ål adult education college, at different stages of the project. The report basically gives the same presentation as von Tetzchner & al.

Nilsson, S.-H. (1990) High Bit Ratio Communication for Deaf and Hearing-Impaired People
This is a technological description of the Swedish pilot of the RACE 1054 project. The report gives the same basic details as Dopping (1991), see above.

Pearson, D.E. (1976) An experimental Visual Telephone System for the Deaf

This report describes one of the first videotelephone trials for deaf people and for people with disability. The report is a planning report for a trial of at least five years. The trial will take place at the office of the English Royal National Institute of the Deaf and will be an in-house experiment. Five terminals will be distributed among a staff of 50 persons, joined into a closed circuit TV-network where it will be possible for deaf people to communicate with each other and with hearing people using sign language and also verbal language.

Pearson, D.E. (1981) Visual Communication Systems for the Deaf

This report is in two parts and presents the results of a six-year project (see above) with a closed circuit TV-telephone system (Switched TV) for deaf and hard-of-hearing people at the headquarters of the Royal National Institute for the Deaf in London. The project has so far resulted in 10.400 request video calls. Although the large amount of calls, the network has been experienced as too small and an additional five terminals have been brought into operation recently. The report discusses the necessary speed for a satisfactory system and suggests that just-comfortable communication is possible at speeds of 100 Kb/s and just-possible communication at 5 Kb/s.

Pyfers, L., Smoorenburg, G. F., Huiskamp, T. & Frowein, H. (1990) Telecommunication Requirements and Facilities for the Hearing-Impaired

The report is a summary of a survey of the special telecommunication needs of hearing-impaired people and solutions offered by public and private enterprises in the Netherlands. Hearing impairment includes all groups of people with any kind of hearing impairment. The results of the surveys are presented and requirements, facilities and problems related to visual telecommunication for this group are reviewed. A short analysis of the relative advantages and disadvantages of videotelephony and texttelephony are also compared.

Sperling, G. (1981) Video Transmission of American Sign Language and Finger Spelling: Present and Projected Bandwidth Requirements

American Sign Language (ASL) communication was videotaped and shown to a group of deaf people with different speeds and with a raster to study at what bandwidths transmission would allow necessary understanding of the signs. The results indicate that a width of 21 Khz is satisfactory. However, transmission at lower speeds will be experienced as satisfactory if more sophisticated picture coding is used, maybe with different codes for sign lagnuage, finger spelling and lip reading.

Tanaka S. (1985) Telewriting Equipment for Deaf and Dumb, "Silverphone Hitsudan" and "Facsimile Signal Display Equipment"
The report presents a texttelephone which allows for handwriting over the network (Hisudan="handwriting"). The telephone has been developed to allow for a mini fax communication possibility at a time when faxcommunication was limited and expensive. It is available, either in a portable version for use in telephone booths etc. or in a version for desktop use. The report gives detailed technical description of the Silverphone and also mentions other types of equipment developed by the NTT, for instance the bone conduction telephone "Hibiki". Compare Yamagami & Ohki (1979).

Torrey, J. (1980) New Jersey's Telecommunication Training Program for the Deaf
The brief report describes a general telecommunication program developed for hearing impaired deaf students. The main technology used is a wide system of TTY-terminals. The main goal of the program has been to socialize the students, to develop their academic skills, to orientate the students of available technology and to develop communication betwen teachers and parents. The training program appears to have been successful and most school districts of New Jersey have become aware of the needs of deaf students.

Touffait-Calvez, F. (1986) Évaluation de communications visiophoniques par des personnes sourdes séveres et profondes
This is a report of a field trial with videocommunication using the videophone COMSIP with deaf people. The main goal of the trial has been to define the support deaf people need to use videotelephony. The second goal has been to suggest a concrete way to approach a new medium for deaf people. 118 persons participated in the study which investigated different modes of communication for deaf people through videotelephone. Most of the people participated in short-time trials and they also tried sign communication.

Touffait-Calvez, F. & Besson, R. (1986) Étude théorique at pratique de l'émission et de la réception des messages dans les differents modes de communication utilisées par les sourd
This is a consise description and analysis of all the different communication modes of deaf people. It includes the description of sign languages, where the American one is compared to the French one. A description of spoken language and signed alphabetical systems is included. The report also gives a fundamental analysis of the principles behind human communication in general and specifies the visual content of human communication. The report is a theoretical baseline fo the French work with videotelephony for deaf people.

Whybray, M. (1991) Visual Telecommunication for Deaf People qt 14.4 Kbit/s on the Public Switched Telephone Network

This is a description of a lowspeed videotelephone system, independent of ISDN, developed in Great Britain and allowing for understandable sign language communication. It was presumed that the use of an analogue Public Switched Telephone Network (PSTN) for videophone communication, the whole world would literally open up. Therefore studies were made to define the necessary quality of picture transmission in such a system, resulting in specifications for a system similar to the one described in Whybray & Hannah (1988). The report describes the development of two generations of usable equipment and several field trials - for instance the very first occation of sign language communication over the common telephone network in 1989 - using the technology. It also concludes that deaf users have experienced the picture quality as satisfactory.

Whybray, M. (1991) Visual Telecommunications for Deaf People at 14.4 Kbit/s on the Public Switched Telephone Network

The report is another presentation of the English work with low bit-rate 14.4 Kbit/s narrow-band videocommunication on the public telephone network. Se also Whybray (1990).

Whybray M.(1992) Moving Picture Transmission at Low Bitrates for Sign Language Communication

The report describes the results of field trials using the Valledge transmission technology, which the users have experienced as non-sufficient. Therefore a different coding algorithm has been developed providing full grey-scale communication. The coding is based on the ccitt Recommendation H.261 algorithm. This new technology is usable on the analogue network and some prototypes have been evaluated during 1992 with favourable results. The frame rate of the telephone is within the rate which is assessed as acceptable by deaf evaluators of the system. However, a broadband network will allow for better picture quality although a videophone with a low bitrate will probably always be more available for economical reasons. There are possibilites of a mass-market distribution of this telephone.

Whybray, M. & Hanna, E. (1988) A DSP Based Videophone for the Hearing Impaired Using Valledge Processed Pictures

An image-coding technology producing "cartoon-like" pictures of movements at a speed of 9.6 Kb/s is described. This technology allows for the contours of signs - a line-based "cartoon-like" system with no grey-scale - to be transmitted and received over the telephone network using modems. The report describes the technology behind this effort and presents preliminary positive reactions from a group of deaf sign language users to the quality of the picture transmission.

von Tetzchner, S. (1991/a) Sign Language
The report presents a brief analysis of sign language, the characteristics and structure of signing and its users. The analysis is then used to describe the possibilities of using sign language through videophone communication and the aim of the report is to present some sign language users reactions to signed communication over the videophone. Two projects are reported. In the first project deaf school-children at a school for deaf tried a videophone system in a link between two schools. A small group of deaf pre-school children were also connected to the project. A special software - Synercom - was used allowing the children to draw pictures and write to each other at the same time as they were using the videophone, a kind of multimedia system. The children helped in many ways in developing this prototype system.

The second project involed deaf adults living in four cities in Norway. Videophones were installed in the local offices of the Norwegian association for the deaf in two of the cities and at an education center for signing and deafness as well as at the office of the Journal of the Deaf. All participants were used to texttelephones. The result of this investigation indicates that most users find the recent videophone system too slow in transmitting the symbols. Communication by texttelephone is preferred.

The conclusion was that all the users wanted an interactive well-functioning videophone technology and that they experienced frustration with the imperfect transmission quality.

von Tetzchner, S. (1991/b) The Use of 64 Kbit/s Videotelephones for Sign Language
This report is a slightly different version of the report von Tetzcher (1991/a). The same information is included.

Zambrano, J. (1987) Analyse des parametres relatifs a chaque mode de communication utilisé par les sourds, pouvant intervenir dans l'intelligibilité d'un change par images animées
The report analyzes the communication of deaf people and it concerns the possibilities and limitations of communicating with pictures. The report contains a description of the different methods of communication, including cued speech, sign language, lip reading etc. These methods are analyzed deeply regarding relevant elements for picture communication. The report is based on a series of simulated trials with a CCTV-system and constitutes a theoretical baseline for further work in the field.

Zambrano, J., Lucas, J.J. & Besson, R. (1987) Evaluation de communications visiophoniques par des personnes sourdes profondes sur le site de Biarritz
This is a description of a trial with videotelephone communication for deaf people in Biarritz. The report gives a detailed technical description of the videophone used (COMSIP) and of the project where thirteen deaf persons participated. The trial consisted of transmissions of numbers and words by signs and speech and the intelligibility of the signs and the lip movements were evaluated. Technical as well as personal parametres were observed.

8.5 Speech and language impairment

This is an area where almost no work has been done, yet. A few experiments with still picture telephony and fax communication as well as experiments with graphical text and symbol-based distance communication are the only experiments. Language impaired persons such as people with Aphasia will most probably benefit from using videotelephony in their communication.

Alstad, K. & Bachman, F. (1990) Telewriting - En Metode For Fjernundervisning av Afasirammede (A Method for Distance Education of People with Aphasia)
In northern Norway a new method using a special pen-terminal as a therapeutic aid for people with Aphasia has been evaluated. The report gives some examples of the results of this method of distance treatment which in reality is no videotelephone communication, but rather a never-before investigated method of graphically based distance communication. The pen-terminal has been used in supervision and therapy at a distance between a speech-pathologist/supervisor and a person with aphasia. The preliminary results were that the clients showed improvements in their writing skills. The work will continue under more controlled conditions.

Holand, U. (1991) Use of Graphic Communication in Distance Training of Patients with Aphasia
The report describes the syndrome Aphasia and its frequency in Norway. Examples are given of the main Aphasia rehabilitation centres and the report describes a project in northern Norway where a pen-terminal, a telewriter was used as a tool to give aphasic persons treatment and communication possibilities. The participants were chosen from two rehabilitation institutions and they were tested according to two different tests. The method showed that there was an increase in the capacity to tell stories after using the telewriter.

Holand, U. (1991) Use of Graphic Communication in Distant Training of Patients with Aphasia
This is an article with a similar content as the above mentioned.

Kennedy, A. (1991) Telecommunicating with Blissymbols
One of the first trials using BLISS-symbols in a telecommunication system is reported from the project BLISS-Tel at BCI in Toronto. A specially developed software is described and the resulting standard for telematic symbol communication as well as the field trial itself. Most of the trials consisted of person-to-person interaction but not in real time. The software, however, contained support for BBS-communication, using Bliss-symbols. The report is a functional report and gives no detailed technical information.

Magnusson, M. (Ed) (1992) Rapport från Nordiskt utvecklingsseminarium inom Afasiområdet, [Report from a Nordic Seminar on Development of Software for People with Aphasia]
This is a report from a Nordic seminar intended to stimulate further Nordic cooperation regarding development of software for people with Aphasia. Programs available in the Nordic countries, stressing on picture based programs and their use over the telenetwork were discussed.

Magnusson, M. (1991/a) Talhandikapp och telematik [Speech Impairment and Telematics]
This is an investigation into the possibilities and needs of speech impaired people in the field of telematics. The report presents some groups with speech impairment and describes their specific problems. Actions and proposals are considered in order to make telematics more useful for speech impaired people.

Magnusson, M.(1991/b) Picture Based Communication for Dysphasic People
The paper reports on the planned trial of still picture telephony and fax communication for speech impaired people, especially people with Aphasia. The report shows that the technology is promising new communication possibilities. It is suggested that still picture communication will be a support to general telephone communication and that it will be a first technological step towards real picture-based telematic interaction - moving picture vodeotelephony for speech impaired people.

Magnusson, M. (1992) Still Picture Telephony for People with Aphasia
This is a report describing some of the results of still picture telephony for people with aphasia. The report shows that still picture telephones are experienced as similar to fax-communication. It is stated that still picture

telephony is of interest to people with Aphasia. The report also gives preliminary results from a few case studies.

Nilsson, B., Skjetne, J.-H. & Skjørten, A. (1991) Sema Tel
This report is from an investigation into available methods and programmes in order to make symbol based distance communication possible for persons with severe communication impairments. The Canadian BLISS-Tell (Kennedy, 1991) is described as well as the Italian and Swedish experiments and there is a suggestion of future actions. The symbol systems described include BLISS, Pictogram and ordinary pictures. The aim of the project is to suggest concrete software development.

Pyfers, L. (1992) Sesame: an Interactive Video Lexicon Aphasiology
A software using the DOS-environment is described as well as a videodisc equipment to handle a database of pictures used as a therapeutic communication tool. A database of words is stored on the harddisk of a personal computer. The interface of the system allows the user to handle it, either as a training tool or as a direct communication aid. The strategies of the system do not concentrate on drill-practices. Instead it allows for building of structures and composing personal messages. The system is a desktop system and is not planned for remote use.

Tronconi, A. (1990) Blissymbolics-based Telecommunication
A prototype system for telecommunication use with BLISS-symbols is described. The system is PC-based and is intended for a LAN7 Local Area Network. The intention is that any symbol system should be made usable and that a standardized communication record for BLISS-symbols should be developed in the same way as has been done in Canada and Sweden.

Wertz, R.T., Dronkers, N. F., Bernstein-Ellis, E., Sterling, L. K., Shubitowski, Y., Elman, R., Sheanut, G. K., Knight, R. T. & Deal, J. L. (1992) Potential of Television and Telephonic Technology for Appraising and Diagnosing Neurogenic Communication Disorder in Remote Settings
A report from a simulation study using a videoconferencing system in order to reach patients living far from the care-taking centre. The aim of the study is to see whether diagnosis and analysis of aphasic behaviour could be done through a visual system and at a distance. The study compared traditional face-to-face diagnosis with appraisal and diagnosis by closed circuit televison and also computer controlled video laserdisc using the telephone. The results suggest that either of the telematical methods could be used as a substitute to traditional methods, thus saving personal visits.

von Tetzchner, S. (1991) Use of Graphic Communication Systems in Telecommunication
This is an overview of different graphical methods of communication with examples of distance communication. Some of the methods described are the sign language system for deaf people and the BLISS communication system for speech impaired persons. Different solutions to convert symbols into text and vice versa are discussed and a review of the few existing experiments is presented. A brief description of a trial with picture telephony is also mentioned.

8.6 Visual Impairment

Bikson,T.K., Bikson, T.H. & Genensky, S.M. (1978) Interactive Classroom Television Systems: Educational Impact on Partially Sighted Students
This is a planning document for a project to evaluate the use of an interactive classroom television system for partially sighted elementary school students. The system will be evaluated as a support for reading and writing and the evaluation will concentrate on the factors that will or will not alleviate the classroom situation for the students. The report contains the plans and a description of the equipment used. The main intent is not to use the system as a communication aid but primarily as a reading tool.

Bikson, T.K., Bikson, T.H. & Genensky, S.M. (1981) The Impact of Interactive Classroom Television Systems on the Educational Experiences of Severely Visually Impaired Students
This report is from a three year evaluation about an interactive classroom television system used by a group of 24 partially sighted elementary school students. The magnification, brightness and contrast capacities of the monitors and cameras were used in the interaction between the students and the teachers and the students spent almost half of the class-room time using the system. The students showed significant improvement in reading and writing during the project which lasted three years. The report contains recommendations for further research and several policy suggestions. Extracts from teachers' log-books are also included as well as an analysis of costs.

Mehr, E.B., Frost, A.B. & Apple, L.E. Experience with Closed Circuit Television in the Blind Rehabilitation Program of Veterans Administration (1973)
This is a report on a field trial with veterans with low vision using CCTV reading and writing systems, a new technical device at that time. The performance of the systems were compared to other optical systems recommended by optometriacian specialists regarding reading speeds, duration time, minimum print-size, magnification, working distances and

legibility of handwriting. A total of 40 persons participated and 28 of them were recommended to use CCTV.

8.7 Elderly

Burns, R. (1988) A Two-way TV system Operated by Senior Citizens
The report presents the only functioning system of its kind in the world. In Reading, Pennsylvania, USA, senior citizens are programming, operating and financing their own two-way TV system using the local cable television net since 1975. The system is not built on person-to-person interaction, but on the possibility to make your own programmes wherever in the system you might be located. However, at least once the project has experienced a six-point videoconference and the project still continues to grow and to create new patterns of telematic interaction among the participants.

Lappalainen, V. (1991) Videotelephony-based Support Services for Elderly and Mobility Impaired People
This is a report of the Finnish pilot of the RACE-APPSN project. It will supply services and videotelephony communication over the analogue network to three individual pilot sites in Finland. The target group is mainly elderly people and the support has consisted of safety videophone service and remote advice and guidance service. The equipment is described including the network with figures. See also Perälä (1990)

Perälä, J. & al see references under 8.3 Motor disability.

Straka, R. (1988) Altere Menschen und neue Medien. [Old people and new communication technologies]
This is a general report discussing the necessity of using new technology for communication among elderly people in order to raise their quality of life. The report reviews several trials from the USA and other countries and examplifies the technology intended, concentrating on cable-TV. The report raises new problems for gerontology, concentrating on the needs of basic gerontological research and also of new forms of education for the elderly people so that they can make use of the technological outflow.

9. CONCLUSIONS

This report includes about 190 references on distance based visual or picture communication, mainly about videotelephony. It has been our intention to illuminate and focus on the need of new and pertinent information in this dynamic field. The ambition of the report has been to select the most useful references about videotelephony and disability published during the last 20 years. The data has been collected from some of the most frequently used and largest databases in this area as well as from lists of already published reports and articles. We have also included some references from closely related fields These reports are to be considered as examples of additional and recommended reading.

We have excluded all references available before the year of 1972 which has become the borderline. However, there are few reports published before this time and the old references might only be of historical interest.

Our main intention has been to create a tool of relevant information and knowledge for all those who are working in the field of picture based distance communication with an empahisis on videotelephony and disability.

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APPENDIX 1

LIST OF ABBREVIATIONS

APPSN	Application Pilot for People wtih Special Needs
ATD	Audivisual Terminales Digital
CCTV	Closed Circuit Televion
COST	European Co-operation in the Field of Scientific and Technical Research
DPCM	Digital
DIMENSIONAL	2D = two dimensional, 3D = three dimensional
HDTV	High Definition Television
IPSNI	Integration of People with Special Needs into Integrated Broadband Communications
ISDN	Integrated Services Digital Network
IBCN	Integrated Broadband Communication Network
LAN	Local Area Network
LCD	Liquid Crystal Display
MHS	Message Handling Systems
NYNEX	The name of a company in New York
NTT	Nippon Telegraph and Telephone Corporation
RACE	Research in Advanced Communications Technologies in Europe
SICS	Swedish Institute for Computer Science
Telecommuting	Remote work using the telenetwork

TDP	Telecommunication for Disabled People
TUDOR	Usability Issues for People with Special Needs with regard to Integrated Broadband Communications
UNIX	A multi-user operating system
UVLC	Universable Variable Length Coding